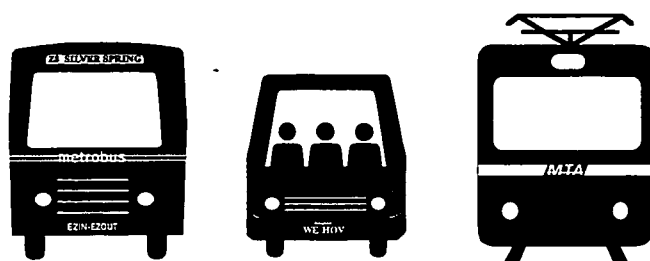


Transitway High-Occupancy Vehicle Network Master Plan

A long range multimodal plan to
increase County-wide mobility



Alternatives Report

January 1995



The Montgomery County Planning Department
8787 Georgia Avenue
Silver Spring, MD 20910-3760

ABSTRACT

TITLE: Alternatives Report of the Transitway and High-Occupancy Vehicle Network Master Plan

AUTHOR: The Maryland-National Capital Park and Planning Commission

SUBJECT: Alternatives Report of the Transitway and High-Occupancy Vehicle Network Master Plan

DATE: January 1995

PLANNING AGENCY: The Maryland-National Capital Park and Planning Commission

SOURCE OF COPIES: The Maryland-National Capital Park and Planning Commission
8787 Georgia Avenue
Silver Spring, MD
20910-3760

NUMBER OF PAGES: 116

ABSTRACT: This publication contains the text with supporting maps and tables for the Alternatives Report of the Transitway and High-Occupancy Vehicle Network Master Plan. The Alternatives Report is the second report leading to the preparation of the Master Plan that will identify rights-of-way to be preserved for future transit and HOV facilities. The Report is based on a demand analysis that has selected those areas benefitting County-wide mobility for further study. Five appendices are also bound in this document. A separately bound Technical Appendix is also available.

*Transitway
and
High-Occupancy
Vehicle
Network
Master
Plan*

ALTERNATIVES

REPORT



Montgomery County Planning Department

8787 Georgia Avenue / Silver Spring, Maryland / 20910-3760

**THE
MARYLAND-NATIONAL
CAPITAL PARK AND
PLANNING COMMISSION**

The Maryland-National Capital Park and Planning Commission

The Maryland-National Capital Park and Planning Commission is a bi-county agency created by the General Assembly of Maryland in 1927. The Commission's geographic authority extends to the great majority of Montgomery and Prince George's Counties; the Maryland-Washington Regional District (M-NCPPC planning jurisdiction) comprises 1,001 square miles, while the Metropolitan District (parks) comprises 919 square miles, in the two Counties.

The Commission has three major functions:

1. The preparation, adoption, and, from time to time, amendment or extension of the *General Plan* for the physical development of the Maryland-Washington Regional District;
2. The acquisition, development, operation, and maintenance of a public park system; and
3. In Prince George's County only, the operation of the entire County public recreation program.

The Commission operates in each county through a Planning Board appointed by and responsible to the county government. All local plans, recommendations on zoning amendments, administration of subdivision regulations, and general administration of parks are responsibilities of the Planning Boards.

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Notice to Readers

A functional master plan, following approval by the County Council and adoption by The Maryland-National Capital Park and Planning Commission, constitutes an amendment to the General Plan for Montgomery County. As such, it provides a set of comprehensive recommendations and guidelines for the use of publicly and privately owned land within its planning area.

County-wide functional master plans are intended to provide a benchmark point of reference with regard to public policy for a specific system. These plans cover such functions as overall circulation systems, parks and recreation facilities, environmental systems, agricultural preservation and such public services as fire and police stations and libraries. A functional master plan reflects a vision of future development for these systems that is balanced with the principal development objectives of the entire County.

Together with relevant master plans, a functional master plan should be referred to by public officials and private individuals when decisions are made that affect the facilities within the plan. It should be noted that functional master plan recommendations and guidelines are not intended to be specifically binding on subsequent actions, except in certain instances where documents such as the Zoning Ordinance or Subdivision Regulations require a specific condition to exist.

Functional master plans generally look ahead to a time horizon when the adopted area master plans will be fully developed. It is recognized that the original circumstances at the time of adoption of a functional master plan will change, and that the specifics of a plan may be viewed differently as time goes on.

Any sketches in an adopted functional master plan are for illustrative purposes only, and are intended to convey a general sense of desirable future character rather than any specific commitment to a particular detailed design.

Comments or questions regarding the Alternatives Report or the Transitway and High-Occupancy Vehicle Master Plan should be directed to:

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8787 Georgia Avenue
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for the
Transitway and High-Occupancy Vehicle
Network Master Plan**

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Technical Advisory Committee for the
Transitway and High-Occupancy Vehicle
Network Master Plan**

The Maryland-National Capital Park and Planning Commission

Montgomery County Planning Department

Community Planning Division
Design, Zoning, and Preservation Division
Development Review Division
Environmental Planning Division
Research and Information Systems Division
Transportation Planning Division

Montgomery County Department of Parks

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Park Planning and Development Division

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Montgomery County

Department of Transportation
Department of Environmental Protection
Office of Planning Implementation

County Council Staff
City of Rockville
City of Gaithersburg

State of Maryland

Maryland Department of Transportation

Mass Transit Administration
Office of Systems Planning and Evaluation
State Highway Administration

Department of the Environment
Department of Natural Resources

Other

Metropolitan Washington Council of Governments
Washington Metropolitan Area Transit Authority
Frederick County Planning Department
Fairfax County, Office of Transportation
Howard County Planning Department
Prince George's County Government

The Master Plan Development Process for the Transitway and High-Occupancy Vehicle Network Master Plan

Issues Report (Phase I) - This document, prepared by the Montgomery County Planning Department, identifies the broad range of issues to be addressed, the methodology to be employed, and the goals to be achieved in the development of the master plan. Additionally, the Issues Report describes the work program for the master plan process, including citizen participation. Once completed, the Issues Report is presented to the Montgomery County Planning Board for its review and consideration. Following the Planning Board's review, staff then proceeds to develop the Alternatives Report.

Alternatives Report (Phase II) - The publication of an Alternatives Report is unique to the development of the Transitway and HOV Network Master Plan and is a major step in the development of the Staff Draft Plan. The Alternatives Report will contain a set of alternative network corridors to be evaluated and refined and will recommend that one of these network alternatives be approved by the Planning Board for further refinement and detailed delineation. Staff will hold public forums to present the recommendations of the Alternatives Report and to receive public comment. The Planning Board will have open worksessions to consider the staff recommendations and public comments before taking action on the Alternatives Report.

Staff Draft Plan (Phase III) - This document is prepared by the Montgomery County Planning Department for presentation to the Montgomery County Planning Board. A Public Hearing (Preliminary) Draft Plan is then prepared for approval to go to public hearing by the Planning Board. The Public Hearing (Preliminary) Draft Plan incorporates those preliminary changes to the Staff Draft Plan that the Planning Board considers appropriate.

Public Hearing (Preliminary) Draft Plan - This document is a formal proposal to create or amend an adopted master or sector plan prepared by the Montgomery County Planning Board of the Maryland-National Capital Park and Planning Commission. It is prepared for the purpose of receiving public hearing testimony. Its recommendations are not necessarily those of the Planning Board. Before proceeding to publish a Planning Board (Final) Draft Plan, the Planning Board holds a public hearing. After closing the record of this public hearing, the Planning Board holds open worksessions to review the testimony and to revise the Public Hearing (Preliminary) Draft Plan.

Planning Board (Final) Draft Plan - This document is the Planning Board's recommended Plan. After October 1, 1992, changes in the Regional District Act require the Planning Board to transmit the Plan directly to the County Council with copies to the County Executive. The Regional District Act then requires the County Executive, within sixty days, to prepare and transmit a fiscal impact analysis of the Planning Board (Final) Draft Plan to the County Council. The Executive may also forward to the County Council any other comments and recommendations regarding the Planning Board (Final) Draft plan within the sixty-day period.

After receiving the Executive's fiscal impact analysis and comments, the County Council may hold a public hearing to receive public testimony on the Plan. After the close of record of this public hearing, the Council's Planning, Housing, and Economic Development Committee (PHED) holds open worksessions to review the testimony and revise the Planning Board (Final) Draft Plan. The County Council, after its worksessions, then adopts a resolution approving the Planning Board (Final) Draft Plan as revised.

Adopted Amendment - The Plan approved by the County Council is forwarded to the Maryland-National Capital Park and Planning Commission for adoption. Once adopted by the Commission, the Plan officially amends the various master or sector plans cited in the Commission's adoption resolution.

TRANSITWAY AND HIGH-OCCUPANCY VEHICLE NETWORK MASTER PLAN DEVELOPMENT PROCESS

Planning Board submits, and Council approves:

Annual Work Program

Planning Board appoints Citizen Advisory Committee. Planning staff initiates community participation and prepares:

Issues Report

Planning Staff reviews Issues Report with Planning Board, and then prepares:

ALTERNATIVES REPORT

Planning staff and CAC review Alternatives Report with Planning Board, staff then prepares:

Staff Draft Plan

Planning Board reviews Staff Draft and, with modification as necessary, approves plan as suitable for public hearing.

Public Hearing (Preliminary) Draft Plan

Planning Board reviews public hearing testimony, receives Executive comments at Board worksessions, and adjusts Public Hearing Draft to become:

Planning Board (Final) Draft Plan

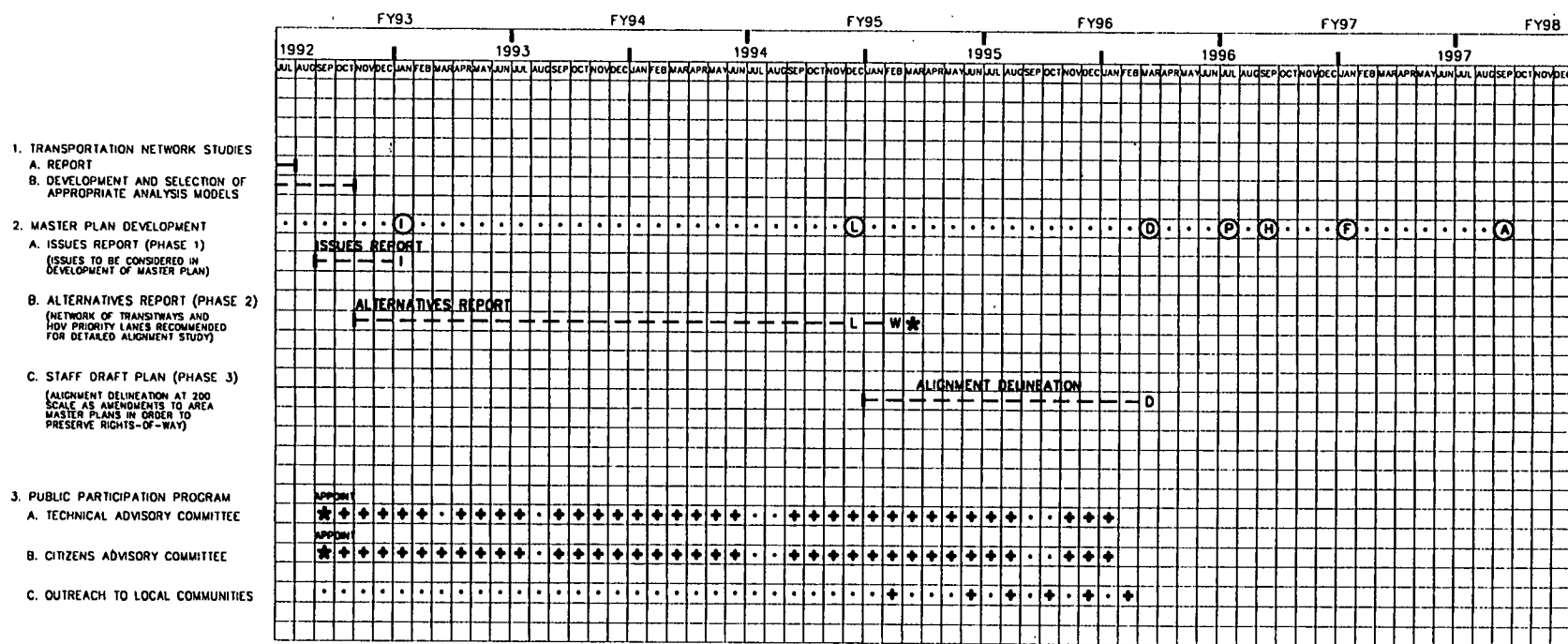
Executive reviews Planning Board Draft and forwards fiscal impact analysis and comments to County Council.

Planning Board (Final) Draft Plan Transmitted to County Council

Council holds public hearing and worksessions and approves, disapproves or amends Planning Board Draft, which is forwarded to M-NCPPC to become

Approved and Adopted Master Plan

WORK PROGRAM FOR THE STAFF DRAFT
TRANSITWAY AND HIGH-OCCUPANCY VEHICLE
NETWORK MASTER PLAN
MONTGOMERY COUNTY PLANNING DEPARTMENT



Actors

C - County Council
E - County Executive
B - Planning Board

Events

W - Worksession
H - Public Hearing
★ - Action
⊕ - Meeting

Products

I - Issues Paper
D - Staff Draft
P - Public Hearing Draft
F - Planning Board Draft
A - Adopted Plan
L - Alternatives Report

DECEMBER 1994

Preface

To allow people to travel freely and easily in Montgomery County in the future, the County's Planning Department is preparing the Transitway and High-Occupancy Vehicle Network Master Plan, a document that will coordinate the development of some county transportation facilities with those in the other parts of the Washington metropolitan region. One step in the preparation of the Master Plan has been the development of this report, called the Alternatives Report. It examines 19 different transitways and high-occupancy vehicle (HOV) routes — often called “alignments” — that could supplement the transportation facilities likely to be in place by 2010. This Report recommends that:

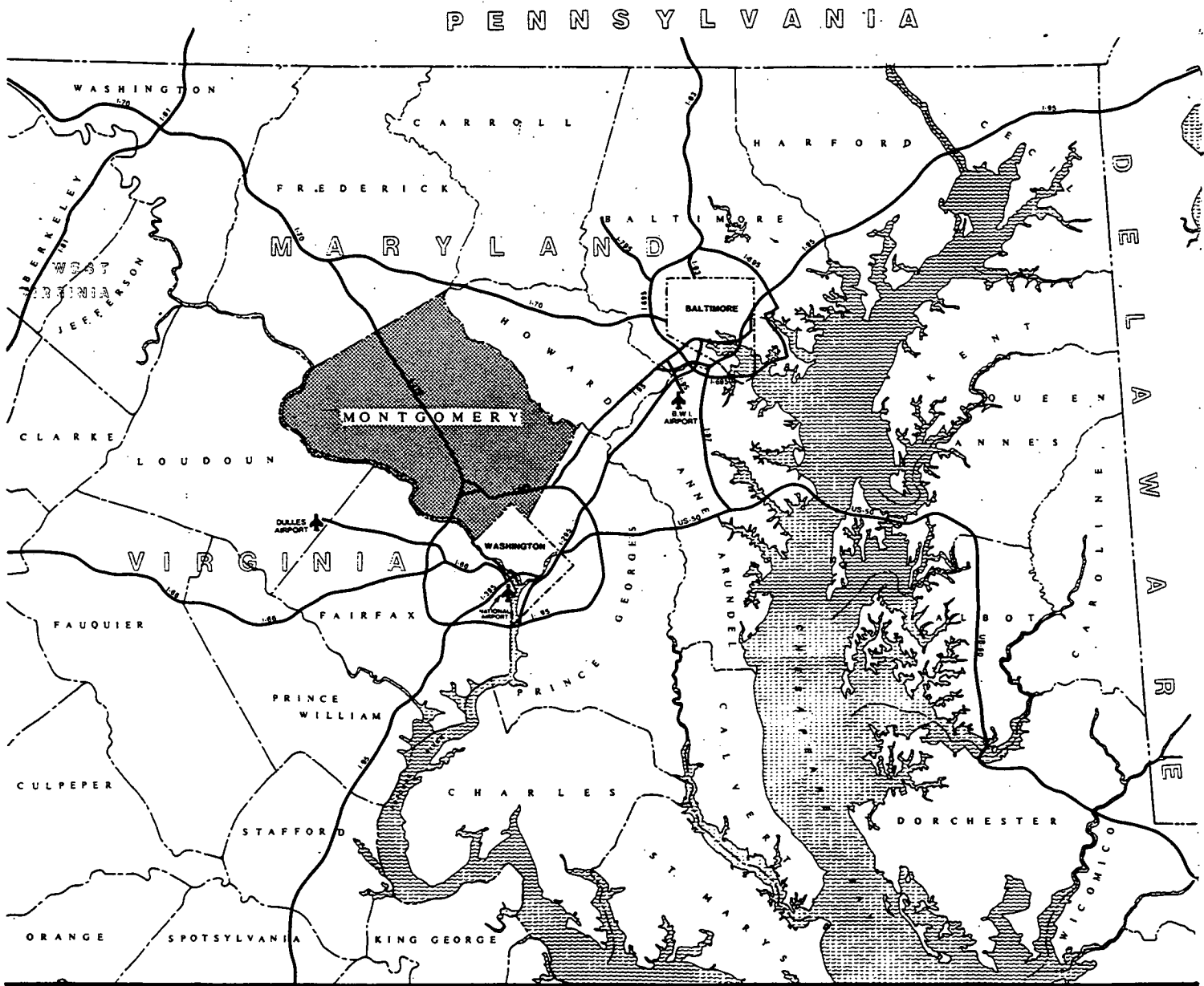
- one transitway alignment receive additional study by the Planning Department,
- three transitway alignments receive additional study by other agencies or receive future study by the Planning Department,
- three alignments be studied by other agencies for bus system improvements,
- one long-haul HOV facility be studied by other agencies,
- two spur HOV lanes (pieces of larger alignments) be studied by other agencies,
- the other eleven alignments be eliminated from further consideration.

Two maps have been included to help readers visualize the area's transportation network. Map A shows Montgomery County's location north of Washington, D.C. and how it is connected to the region by the Capital Beltway (I-495), I-270, and other roads. Map B shows how the County is served by the Metrorail Red Line and by the Brunswick line of the MARC commuter rail. Map B also shows the regional transit and HOV facilities that are under construction, on area master plans, and under study.

Because this Report contains substantial technical information, appendices have been included to explain:

- the analytical tools and processes,
- the technical terms and concepts,
- the national and regional transportation planning trends.

Two sets of appendices are available: five are bound in this document (1-5), twelve are available separately in the Technical Appendix (A-L).



REGIONAL LOCATION

NORTH



	Existing	Planned	Proposed
METRORAIL			
MARC AND VIRGINIA RAIL EXPRESS			
TRANSITWAY			
CSXT AND AMTRAK			
HOV LANES			



**The Maryland-National Capital
Park and Planning Commission**



List of Acronyms

AGP	Annual Growth Policy
CAA	Clean Air Act Amendments of 1990
CAC	Citizens Advisory Committee
CBD	Central Business District
CIP	Capital Improvements Program
CTP	Consolidated Transportation Program
COG	Metropolitan Washington Council of Governments
EIS	Environmental Impact Statement
HOV	High-Occupancy Vehicle
ICC	Intercounty Connector
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
LRP	Long Range Plan
LRT	Light Rail Transit
MARC	Maryland Rail Commuter
MCDOT	Montgomery County Department of Transportation
MDOT	Maryland Department of Transportation
MIS	Major Investment Study
MPO	Metropolitan Planning Organization
MTA	Maryland Mass Transit Administration
PMT	Passenger Miles Traveled
SCAS	Statewide Commuter Assistance Study
SHA	Maryland State Highway Administration
SOV	Single-Occupancy Vehicle
TAC	Technical Advisory Committee
TPB	Transportation Planning Board
WMATA	Washington Metropolitan Area Transit Authority

Table of Contents

	<u>Page</u>
Preface	xi
List of Acronyms	xv
1. Introduction	1
A. Purpose and Process	2
B. Preserving Right-of-Way	8
C. Evaluating the Alignments	9
D. Relationship with Planning Policies	13
E. Relationship with Area and Sector Plans	15
F. Effects on Land Use Recommendations	15
G. Public Participation Process	16
2. Transitway Alignments: Evaluation Results	19
A. Georgia Avenue (Alignment E)	25
B. Grosvenor-White Oak (Alignment R)	29
C. US 29 (Alignment A)	37
D. Bethesda-Tysons Corner (Alignment P)	44
E. Alignments Recommended for Bus Service Operational Improve- ments	49
3. HOV Alignments: Evaluation Results	51
A. Long-Haul HOV Facilities	53
B. Spur HOV Alignments	56
C. Shared HOV Alignments	58
4. Transitway and HOV Networks: Evaluation Results	59
A. Transitway Network	59
B. HOV Network	61
C. Combined Transitway and HOV Network	63
5. Future Steps	65
A. Transit Network	65
B. HOV Network	67
C. Sequence of Implementation	68

Appendices

	<u>Page</u>
Appendix 1 Glossary of Terms	73
Appendix 2 Planning Policy Background	77
A. Regional Long Range Plan Development	77
B. Relationship with Federal Policies	78
C. Relationship with State Policies	79
D. Relationship with Regional Policies	80
E. Relationship with the General Plan	82
F. Maryland Economic Development, Resource Protection, and Planning Act of 1992	85
Appendix 3 Related Transit and HOV Planning Studies	87
A. Capital Beltway (I-495)	87
B. Intercounty Connector (ICC)	89
C. US 29	89
D. I-270 HOV Lanes	89
E. I-270 Multimodal Study	90
F. Corridor Cities Transitway	91
G. North Bethesda Transitway	91
H. Georgetown Branch Transitway	92
I. Silver Spring Multimodal Transit Center	93
Appendix 4 Transitway Analysis Background	95
A. Transitway Evaluation Process	95
B. Transitway Evaluation Measurements	98
C. Alignment Alternatives	101
Appendix 5 Bibliography	109
Index	115

List of Maps

	<u>Page</u>
Map A Regional Location	xii
Map B Regional Context	xiii
Map C Alignments Evaluated in this Alternatives Report	11
Map D Recommended Transitway Network	18
Map E Recommended HOV Network	52
Map F Related Transit and HOV Planning Studies	88

List of Figures

	<u>Page</u>
Figure 1 Work Program Chart	x
Figure 2 Steps to the Staff Draft Master Plan	3
Figure 3 Location of Georgia Avenue Alignment	25
Figure 4 Location of Grosvenor-White Oak Alignment	30
Figure 5 Location of US 29 Alignment	38
Figure 6 Location of Bethesda-Tysons Corner Alignment	45
Figure 7 Segments and Junctions	97
Figure 8 Transit Accessibility	99
Figure 9 East-West Transitway Alternatives	104

List of Tables

	<u>Page</u>
Table 1 Forecast Growth Rates for Neighboring Jurisdictions: 1990-2010	2
Table 2 Factors Identified in <u>Issues Report</u> to be Addressed in Network Master Plan	7
Table 3 Nineteen Alignments Were Evaluated in the Alternatives Report	10
Table 4 Summary Table: Evaluation Results for Proposed Transitway Alignments	23
Table 5 Summary Table: Effects of Proposed Transitway Alignments on Other Transit Systems	24
Table 6 Transitway Vehicles Travel Faster Than Cars on Georgia Avenue	27
Table 7 Metrorail Red Line Use Increased with Georgia Avenue Transitway	28
Table 8 Transfer Points Tested with Georgia Avenue Alignment	29
Table 9 Connecting North Bethesda Transitway with White Oak More Than Doubles Transit Travel Between Them	36
Table 10 Grosvenor-White Oak Connection Improves Metrorail and North Bethesda Transitway	36
Table 11 Stations Tested with Grosvenor-White Oak Alignment	37
Table 12 Transitway on US 29 Significantly Boosts Transit Demand	42
Table 13 US 29 Has Strong Effect on Georgetown Branch and Metrorail	42
Table 14 Stations Tested with US 29 Alignment	44
Table 15 Alignment Substantially Increases Transit Demand Between Bethesda and Tysons Corner	47
Table 16 Georgetown Branch, Metrorail Beneficiaries of Bethesda- Tysons Corner Alignment	47
Table 17 Stations Tested with Bethesda-Tysons Corner Alignment	48
Table 18 Long-haul HOV Evaluation Results	54
Table 19 Spur HOV Evaluation Results	57
Table 20 Transitway Network Substantially Increases County-wide Transit Demand	60
Table 21 Effect of Transitway Network on Other Transit Facilities	61
Table 22 Clara Barton/Cabin John and Spur HOV Alignments Help Carpools County-wide	62
Table 23 Transitway and HOV Networks Together Increase County-wide HOV Accessibility	63
Table 24 Transitway and HOV Networks Boost Georgetown Branch and Metrorail	63

List of Tables

(continued)

	<u>Page</u>
Table 25	Federal Goals Met by the Transitway and HOV Network Master Plan 79
Table 26	Transitway and HOV Network Master Plan Fulfills Many Regional Transportation Goals 81
Table 27	Transitway and HOV Network Master Plan Helps Achieve Many Goals of the General Plan Refinement 83
Table 28	Seven Visions of the State Resource Protection and Planning Act of 1992 85
Table 29	Alternative Sites for East-West Transit Connection 102
Table 30	Alternatives for East-West Transitway Connection 103
Table 31	Evaluation of Alternatives for East-West Transit Connection 106

Technical Appendix

The Technical Appendix, available separately, contains additional information helpful in understanding the process and information used in the Alternatives Report.

Alignment Evaluation Process

- A. The TRAVEL/2 Transportation Model
- B. Transitway Evaluation Process
- C. HOV Evaluation Process
- D. Measures of Success

Washington Region in 2010: Transportation and Land Use

- E. Description of the Background Transportation Network
- F. Regional Land Use Forecasts

Modes of Transportation

- G. Functional Classification of Transportation Elements
- H. HOV
- I. Light Rail Transit
- J. Busways

Planning Policies

- K. Master Plan Transit Recommendations
- L. Planning Background Summaries

Separate Reports:

A number of reports, books, and articles were helpful in the preparation of the Alternatives Report and are referenced in Appendix 5. The following reports can be found at the Montgomery County Planning Department:

- The Impact of Transitways on Property Values
- An Examination of the Costs of Auto, Metrobus, and Metrorail
- The Link Between Land Use and Air Quality
- Transit and Pedestrian Oriented Neighborhoods
- History of Transportation in Montgomery County



1.

Introduction

The high quality of life and the economic vitality of Montgomery County depends in large part on an efficient County-wide and regional transportation network. Today, the regional network shows severe strain. Currently, approximately one million vehicles per day use the Capital Beltway (I-495) for part of a trip. Lengthy backups on radial highways such as Georgia Avenue (MD 97), Rockville Pike (MD 355), and US 29 are a familiar scene. Traffic on the County's three primary east-west roadways — East-West Highway (MD 410), the Beltway, and Randolph Road — is often bumper-to-bumper.

Population and employment growth are going to compound the problem. According to forecasts, during the next 15 years in the Washington region:¹

- population will increase by 22 percent,
- employment will increase by 41 percent,
- development will continue to spread further from Washington, D.C.,
- auto ownership will edge upward toward one car per licensed driver,
- multiple-occupancy auto travel will continue to slide downward,
- transit usage will stagnate.

Population and employment growth in Montgomery County and neighboring jurisdictions will place more demands on the regional network. Increases in population and employment increases for neighboring jurisdictions are in [Table 1](#). (The Washington region is shown in [Map A](#).) In response to the travel demand that the growth portends, Montgomery County must enhance mobility by providing people with additional travel options.

¹ All data from Round 4.1 2010 land use forecasts compiled by the Metropolitan Washington Council of Governments (COG) in cooperation with jurisdictions around the region. Since the more recent Round 5.1 forecasts were introduced in the middle of this analysis, they were not used. [Appendix F](#) explains these forecasts and processes in further detail.

Table 1
Forecast Growth Rates for Neighboring Jurisdictions: 1990-2010

	Population		Employment	
	Growth (thousands)	Rate	Growth (thousands)	Rate
Montgomery County	110	16%	215	47%
Prince George's County	123	17%	161	52%
Howard County	74	42%	34	40%
Frederick County	95	63%	64	117%
Anne Arundel County	57	14%	24	11%
Fairfax County	203	25%	214	52%
District of Columbia	--	0%	168	23%

From: Metropolitan Washington Council of Governments Round 4.1 Forecasts.
Discussion and more information on future growth provided in Appendix F.

A. Purpose and Process

The improvement of mobility within Montgomery County is the goal of the Transitway and High-Occupancy Vehicle Network Master Plan. This planning effort will identify rights-of-way that need to be preserved for transitways and high-occupancy vehicle (HOV) lanes and integrate them into the regional network. In short, the Plan will lead to the creation of facilities that will let more people travel to more destinations in less time.

This Alternatives Report is one step in the development of the Master Plan. The Report identifies routes, or "alignments," that will significantly help to satisfy the demand for transit and HOV facilities. The alignments proposed by this Report for further Planning Department study will be presented at a public forum. The Planning Board will consider the comments at the public forum before deciding which alignments will undergo a detailed right-of-way delineation. (The process leading to the Staff Draft Master Plan is charted in Figure 2.) Once the Transitway and HOV Network Master Plan is approved and adopted, the alignments will be placed on area master plans to protect the rights-of-way from further development.

Steps Toward the Staff Draft Master Plan

Past

January 1993



Identified alignments to evaluate in Alternatives Report and issues to consider in all future stages.

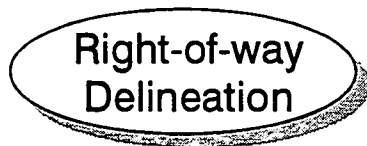
Present

January 1995



Proposes a series of transitway and HOV alignments for further engineering study based on a County-wide demand analysis.

Future



Will determine right-of-way necessary for alignment and associated uses.



Will present staff recommendations for alignments to preserve for future transportation needs.

Section 1

It is essential that the rights-of-way, necessary for Montgomery County's future mobility, be preserved as quickly as possible. Since most of the transit demand in the County comes from the more developed down-county area, most of the alignments having substantial transit demand are there also. Without the timely preservation of these rights-of-way, new development or redevelopment could occur that would significantly increase the cost of the County's future travel options.

Improving Mobility

This planning effort addresses only transitways and high-occupancy vehicle lanes and uses only right-of-way preservation to implement the County's comprehensive strategy to improve mobility. The concept of mobility emphasizes movement. Today, distance is measured not in miles, but minutes. Travel time is more important than travel distance. To improve mobility is to improve the whole transportation network so that more destinations can be reached within a given time, whether the traveler walks, drives a car, rides in a car or a bus, travels by rail, or hops on a bicycle.

The County's comprehensive strategy to enhance both County and regional mobility focuses on many modes of transportation, including:

- widening existing roadways and constructing new ones,
- increasing the frequency and/or coverage of existing bus service and adding new routes,
- making roadways more efficient by establishing HOV lanes,
- coordinating computerized traffic signals and implementing responsive signs that warn drivers of adverse traffic conditions,
- implementing transportation demand management measures — reducing available parking, employer and government transit subsidies, employer-run shuttle services to rail transit, incentives for employees to carpool and travel by public transportation, and policies that encourage telecommuting,
- constructing additional bus and rail transit facilities.

Activity Centers

Another part of the strategy to improve mobility concerns activity centers. The 1993 General Plan Refinement defined such a center as "hubs of community activity, typically including retail uses.... Centers are generally more intensive than surrounding land uses but compatible with those uses." The General Plan Refinement places a great deal of emphasis on maintaining and developing centers around the

County. The transit facilities recommended for further study connect a number of activity centers: the central business districts (CBD) of Silver Spring, Wheaton, and Bethesda, plus the Metrorail station areas of Grosvenor, White Flint, and Rockville. In addition, this Report proposes a connection to Glenmont and one to White Oak. Both locations have significant household or employment concentrations as well as centralized retail. This Report also proposes a connection to Tysons Corner, an employment and retail center in Fairfax County, Virginia.

The densities of the activity centers and, in some cases, the land adjacent to the activity centers, preclude further roadway expansion. However, due to their flexibility, it is not too late to preserve rights-of-way for alternative modes of transportation that may require less space.

Where We Are Now: Alternatives Report

Why has this Alternatives Report been published? It is primarily to stress the importance of releasing the results of the Planning Department's County-wide demand analysis and receiving approval from the Planning Board before funding the subsequent phases of analysis. Furthermore, publishing the Report gives the public an opportunity to become involved in the process.

The danger in issuing an intermediary report is that many people may unrealistically expect the same type of technical data that is found in a detailed analysis and design study that must be prepared before any major transportation project is funded for construction. It is important to remember that the Alternatives Report is only one part of a Master Plan that itself only deals with right-of-way preservation. It is an early step in the lengthy process that may lead to construction.

The alignments proposed by this Report are still conceptual. For instance, the Georgia Avenue alignment is recommended to extend north from the Glenmont Metro station to Olney. But the relationship of the transitway to the existing roadway has yet to be determined. Will the transitway run down the center of Georgia Avenue? Or will it travel on the west or east side? Will it be elevated or underground? How wide will it be? What will the transit stations look like? How would pedestrians and bicyclists get to them?

The Alternatives Report does not answer such questions. That will be the job of the Staff Draft Master Plan and future studies that deal with the construction of each transitway.

Future Steps: Right-of-Way Delineation

The Alternatives Report recommends that one alignment be further studied by the Planning Department as part of the Transitway and HOV Network Master Plan. (See Section 2.) If the recommendation is approved by the Planning Board for further study, the alignment will undergo a detailed right-of-way delineation.

Section 1

The delineation step will be completed by a consultant. The consultant will determine the size and location and describe the right-of-way necessary for the transitway and any supporting facilities on 200-scale (one inch = 200 feet) maps. The results of the detailed right-of-way delineation, which will become a major part of the Staff Draft Master Plan, will include:

- the precise alignment of each transitway,
- the size and location of each station,
- the size and location of necessary storage yards and inspection and maintenance facilities.

A number of factors important in the consideration of transitways and HOV lanes were identified in the Issues Report. Table 2 lists these factors and identifies an appropriate stage of master plan development where each factor should be addressed. While the Staff Draft Master Plan will address all the listed factors, it will only do so to provide a comprehensive overview. Details from future studies will be able to better identify some of them.

Future Steps: After the Transitway and HOV Network Master Plan is Approved and Adopted

Two additional steps would follow the approval and adoption of the Master Plan.

- (1) Reaffirming existing zoning: It will be necessary to file a comprehensive sectional map amendment covering the land within the affected area master plans to reaffirm the existing zoning. This step is consistent with the process in the Georgetown Branch Master Plan Amendment and is necessary to prevent rezoning under the “change or mistake” principle set out by the Maryland Court of Appeals.
- (2) Transitway construction: Any alignment approved and adopted for right-of-way preservation must undergo other studies before a transitway can be constructed. The studies will provide information about:
 - the mode and technology to be built,
 - the speed and frequency of service,
 - ridership projections,
 - detailed environmental and community impacts,
 - how much the transitway will cost.

Table 2
Factors Identified in Issues Report to be Addressed in Network Master Plan

Issues Report Factors (from pages 18-26)	Alternatives Report	Feasibility Study	Right-of- Way Delineation	Staff Draft Master Plan	Major Investment and Project Planning Studies
Environmental impact		✓	✓	✓	✓
Community impact		✓	✓	✓	✓
Conflict with existing land use		✓	✓	✓	✓
Traffic at HOV entrances and at transitway stations				✓	✓
Economic implications	✓	✓		✓	✓
Selection of mode	✓	✓	✓	✓	✓
Role of transitways	✓	✓		✓	✓
Safety		✓	✓	✓	✓
HOV occupancy levels	✓			✓	✓
Station design			✓	✓	✓
Station/Access locations	✓	✓	✓	✓	✓
Location of inspection and maintenance facilities		✓	✓	✓	✓
Effectiveness of HOV lanes on arterial roads	✓			✓	
Effectiveness of light rail in mixed traffic	✓			✓	
Factors Affecting Ridership:					
Connections to existing transportation network	✓	✓	✓	✓	✓
Connections to region	✓	✓	✓	✓	✓
Psychology of use and marketing				✓	✓
Traffic mitigation policies	✓			✓	✓
Pricing	✓			✓	✓
Implementation strategy	✓	✓		✓	✓
Estimated cost		✓	✓	✓	✓
Relationship of density and financial feasibility	✓	✓		✓	✓

B. Preserving Right-of-Way

Rights-of-way for transportation projects, especially roadways, are routinely preserved in Montgomery County. This is normally done within area master plans which analyze sections of the County. The Transitway and HOV Network Master Plan is different: its area of analysis is the entire County. The broader scope calls for the analysis of a comprehensive transit and HOV network rather than one that evaluates transportation piecemeal. The Transitway and HOV Network Master Plan is concerned primarily with improving County-wide mobility and leaves the small-scale issues for the appropriate area master plans and detailed design studies.

In another sense, this planning process is more focused. It looks at only the network's HOV lanes and transitways. An area master plan looks at all transportation elements within its boundaries, including master-planned roads, HOV facilities, transitways, bikeways, and sidewalks.

Effects of Right-of-Way Preservation

State and County law preclude development and redevelopment from occurring on property lying within the area of right-of-way shown on an area master plan. The reason for this limitation is that careful planning has identified the need to construct some type of public transportation facility within the area of the right-of-way to support County development, including adjacent development. Unplanned development allowed to occur within the area of the right-of-way would unnecessarily increase public sector acquisition costs. Further, the unplanned development would not have been factored into public facilities needs analyses and may not be compatible with planned land uses. Rights-of-way can be preserved on either vacant or developed land. The alignments recommended by this Report, however, are primarily in areas with existing development.

The private property that would be directly affected by the master-planned rights-of-way would be precluded from additional development. Building permit applications would not be issued, unless the Board of Appeals approved a variance.

Properties requiring subdivision approval for new construction or redevelopment have two basic options. The developer may be able to cluster allowable development off the master-planned right-of-way. In such cases, the area of right-of-way would be dedicated. Where development density cannot be clustered, the right-of-way can be placed in reservation for up to three years. While in reservation, property is taken off the tax rolls, releasing the owner from the obligation to pay real estate taxes. Thereafter, the owner may elect to extend the reservation period.

Any land purchased by the government during or after the reservation period is calculated at its fair market value. The government may utilize its condemnation power to acquire necessary right-of-way. This process is the same as used for the acquisition of rights-of-way for roadways.

Some people are concerned about the effect of the right-of-way on the value of property. Transitway service may increase the value of nearby properties as a result of improved access. However, unless mitigated, impacts such as noise and visual intrusion may reduce property values.

C. Evaluating the Alignments

The Issues Report recommended a number of alignments for study in this Alternatives Report; more were added during the evaluation process. In all, 19 alignments were studied, although two were not considered as transitways. (See Table 3 and Map C.)

Transitway Analysis: Constructing the Background Network

The transportation network assumed for the year 2010 is described in detail in Appendix E. Briefly, the assumed transit network in Montgomery County is characterized by:

- Metrorail between Friendship Heights and Shady Grove (Red Line west leg) and between Silver Spring and Glenmont (Red Line east leg),
- Two-way MARC service between Union Station in Washington, D.C., and Brunswick, West Virginia, as well as the extension between Point of Rocks and Frederick City,
- Ride-On and Metrobus service much as it is today, and
- Master-planned transit: Georgetown Branch, Corridor Cities, and North Bethesda Transitways.²

² The Georgetown Branch is also known as the Silver Spring-Bethesda Trolley, and the Corridor Cities Transitway is also known as the Shady Grove-Clarksburg Transitway. Only the first designation for each will be used throughout this report.

Table 3
Nineteen Alignments Were Evaluated in the Alternatives Report

-
- A. US 29 from the Silver Spring Metro station north to Burtonsville at MD 198
 - B. Veirs Mill Road-University Boulevard from the Rockville Metro station to MD 201 in Prince George's County
 - C. Randolph Road and Bypass from Veirs Mill Road to US 29
 - D. Montrose Parkway from I-270 to Veirs Mill Road
 - E. Georgia Avenue from the Glenmont Metro station north to a proposed park-and-ride lot north of MD 108 in Olney
 - F. PEPCO Right-of-Way from Montgomery Mall to the Corridor Cities Transitway at Great Seneca Highway
 - G. River Road from Falls Road to the Friendship Heights Metro station or, alternatively, to the Bethesda Metro station
 - H. Great Seneca Highway, Darnestown Road, Wootton Parkway, and Rockville Pike from a Corridor Cities Transitway station to the Rockville Metro station
 - I. Old Georgetown Road from the Bethesda Metro station north to the Grosvenor Metro station
 - J. Midcounty Highway (M-83) from the Rockville Metro station north to the Clarksburg station of the Corridor Cities Transitway, with two connections to the Corridor Cities Transitway via Watkins Mill Road and Ridge Road
 - K. Former Rockville Facility Right-of-Way between Georgia Avenue and the Intercounty Connector
 - L. Randolph Road and New Hampshire Avenue between Georgia Avenue and US 29
 - M. New Hampshire Avenue between US 29 and the Fort Totten Metro station
 - N. Ridge Road from I-270 to Mount Airy north of I-70 in Frederick County
 - O. Norbeck Road-Spencerville Road Connector from the Rockville Metro station to US 29 at Burtonsville
 - P. Bethesda-Tysons Corner from the Bethesda Metro station to a future Tysons Corner transit station
 - Q. Clara Barton Parkway and Cabin John Parkway from Georgetown to the Capital Beltway
 - R. Grosvenor-White Oak from the Grosvenor Metro station/North Bethesda Transitway terminus through the Wheaton Metro station to US 29 at White Oak
 - S. Glenmont-White Flint from the Glenmont Metro station to the White Flint Metro station
-



ALIGNMENTS EVALUATED

ALIGNMENTS EVALUATED ●●●●●●

(A) See Table 3 For Description of Alignment Corridors

Background Facilities

METRORAIL

MARC AND VIRGINIA RAIL EXPRESS

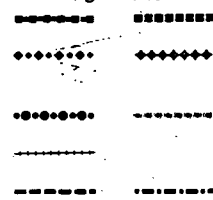
TRANSITWAY

CSXT AND AMTRAK

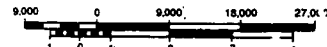
HOV LANES

Existing

Planned



NORTH



TRANSITWAY AND HOV NETWORK MASTER PLAN

The Maryland-National Capital Park and Planning Commission

Transitway Analysis: County-wide Evaluation³

The Planning Department evaluated all of the 17 possible transitway alignments from a County-wide perspective. To do so, it first developed an analysis procedure that comprehensively evaluated the network including all the alignments. By eliminating the time normally required to transfer among the alignments, predominant patterns of County-wide transit travel were identified. A series of evaluations resulted in deleting 10 of the 17 transitway alignments from further evaluation. The remaining seven alignments were evaluated individually; four of the seven were later refined to reflect their use as either a busway or light rail line. (See [Section 2](#) for results.)

HOV Analysis: Constructing the Network

This study also required an HOV network assumed to be in place in Montgomery County in the year 2010. That network is characterized by:

- HOV 2+ peak-period peak-direction restrictions on one lane of I-270 and its spurs between the Beltway and Clarksburg at MD 121,
- HOV 2+ peak-period peak-direction restrictions on I-95 between the Capital Beltway and the Baltimore Beltway,
- HOV 2+ peak-period restrictions on the Beltway in both directions between the American Legion Bridge and I-95,
- HOV 2+ peak-period restrictions on the ICC in both directions between I-370 and US 1 in Prince George's County.⁴

HOV Analysis: Facility Types

Three different types of HOV facilities were evaluated in the analysis:

- Long-haul: A facility longer than four miles that is either on a freeway or connects a freeway to an activity center. Five of the 19 alignments in [Table 3](#) were evaluated as possible long-haul HOV facilities.
- Spur: A short facility on a major highway that links a high-capacity HOV facility to an activity center. Seven spur HOV facilities were evaluated, most of them portions of alignments in [Table 3](#).

³ The process used to evaluate the transit alignments is described further in [Appendix 4](#) (included with this document) and [Appendix B](#) (bound separately).

⁴ All HOV assumptions are either programmed (I-270), being studied (Beltway, ICC), or present on Maryland's Vision Plan (I-95). See [Appendix 3](#) for more detail on current studies.

- **Shared:** A facility where HOVs and high frequency bus service share a separate right-of-way. Two alignments were considered as shared HOV facilities, all of them among the 19 alignments in Table 3.

Evaluation Assumptions

Transportation demand forecasting requires a number of assumptions. These concern primarily the forecast year, future land use patterns, and pricing of transportation modes. The assumptions for the Alternatives Report analyses were conservative to ensure reliability and acceptance of the forecasts.

Transportation forecasts, transit in particular, often forecast to a horizon of 40 or 50 years. The forecast year (2010) was determined by the latest year projected by regional land use information. This information was obtained from the Round 4.1 land use forecasts of the Metropolitan Washington Council of Governments (COG). The Issues Report stated that the Alternatives Report would use as a forecast year “build-out,” or the state at which all zoning capacities are filled. The Alternatives Report did not use build-out as a forecast year for a number of reasons enumerated in Appendix A.

COG’s land use forecasts are the accepted standard for employment, population, and household growth projections around the region. COG recently issued a periodic update, Round 5.0 (followed in short order by Round 5.1). Since it was issued in the middle of the Alternatives Report evaluation process, the Planning Department continued to use the Round 4.1 forecasts for consistency’s sake. The Planning Department does not believe that the new forecasts will alter the findings of this Report. Furthermore, a conscious effort has been made throughout this evaluation to keep the comparative price of travel similar to that of today.

D. Relationship with Planning Policies

The face of transportation planning is rapidly changing. This planning effort must consider its relationship with all levels of planning, particularly since its scope covers the entire County and has the potential to affect many different projects and areas.⁵

⁵ Specific goals and objectives from all levels of transportation planning that are relevant to this Master Plan are listed and discussed in Appendix 2.

Federal Legislation

Recent federal legislation places greater emphasis on multimodalism and the enhancement of connections between modes of transportation, including walking, bicycling, rail transit (such as Metrorail), flexibly routed transit (such as Ride-On and Metrobus), single-occupancy driving, and carpooling. It also stresses the need to improve mobility for modes other than the automobile.

Recent transportation and environmental legislation ensure that transportation facilities that threaten air quality will not be federally funded in regions that fail to meet national air quality standards.⁶ Increased transit service, as outlined by the Transitway and HOV Network Master Plan, would benefit regional air quality.

Regional and State Policies

Federal legislation requires that COG and the Maryland Department of Transportation (MDOT) periodically submit plans for transportation projects to be constructed during the next 20 years and that they explain the sources of the projects' funding. As part of mandated long-range planning efforts, COG and MDOT put forth transportation goals and objectives. The Transitway and HOV Network Master Plan fulfills many of the objectives, particularly those designed to promote long-range system-wide planning.

The Master Plan confirms the Maryland Economic Development, Resource Protection, and Planning Act of 1992.

General Plan

The 1993 General Plan Refinement reaffirmed Montgomery County's three-decade-old vision of "Wedges and Corridors." The vision guides development into a sustainable, orderly system and provides a framework for its support. An indispensable part of the framework is the transportation system. The General Plan Refinement stresses the importance of linking transportation modes and coordinating the modes with land use. For example, the Refinement encourages both the location of buildings and the construction of roadways and walkways for convenient access to transit. The emphasis of the Alternatives Report on transit connections between activity centers echoes the Refinement's desire to use transit in support of the County's growth policy.

⁶ The Washington region is classified by the Environmental Protection Agency as a "serious" non-attainment area for ozone and a "moderate" area for carbon monoxide.

E. Relationship with Area and Sector Plans

The approval and adoption of the Transitway and HOV Network Master Plan will simultaneously amend approved and adopted area master plans in the relevant parts of Montgomery County. The amendments will be limited to the identification and placement of rights-of-way.

This Master Plan is being coordinated with all area sector and master plans underway that could be affected by the recommended transitway alignments and/or HOV priority lanes of this Report. The transit recommendations of all adopted master plans affected by one or more of the evaluated alignments is found in Appendix K.

Any alignment in the approved and adopted Transitway and HOV Network Master Plan that directly affects a jurisdiction with separate powers of planning and zoning will require the approval of that government to protect the alignment. Representatives from the municipalities within the County and from adjacent counties serve on the Technical Advisory Committee (TAC) and have been kept fully informed of this planning effort.

F. Effects on Land Use Recommendations

Except for the land needed for rights-of-way, this planning effort will not change the land use recommendations of area master plans. Such changes may only be made as part of a comprehensive master plan amendment for the specific planning areas.

The desirability of land use changes may arise from the increased mobility created by the facilities detailed in this Master Plan. In particular, changes may be appropriate within walking distance of new transit stations. Increased mobility from transit could also cause a reduction in the amount of needed roadway construction. In any case, the nature and location of growth in Montgomery County will be guided by the recommendations of the area master plans rather than this Master Plan.

Relationship with the Annual Growth Policy

Growth around the County is managed by the Annual Growth Policy (AGP), which ensures that the provision of public facilities — transportation, water and sewer, school, and police — and new development is roughly in balance. Transportation facilities can enable additional capacity for jobs and housing only if they are funded within the first four years of the County's Capital Improvement

Program (CIP) or Maryland's Consolidated Transportation Program (CTP). Since this Master Plan recommends transitways for right-of-way preservation rather than construction, it will have no immediate effect on the AGP.

G. Public Participation Process

A Work Program Chart for this Master Plan is shown on page x (Figure 1) that illustrates the projected schedule for completion of the Transitway and HOV Network Master Plan and each of its steps. The complete master plan approval process, including public hearings with the Planning Board and the County Council, is described on pages vii-ix.

Citizens Advisory Committee

The Montgomery County Planning Board launched the public participation process for the Transitway and HOV Network Master Plan by appointing a 14-member Citizens Advisory Committee (CAC) in September 1992. The CAC provides an organized forum for the presentation and discussion of information leading to the development of the Issues Report, Alternatives Report, and the Staff Draft Master Plan. The members of the CAC were selected to provide diverse opinions. The CAC meetings are held once a month and are open to the public; the time and location of each meeting are noted on the Planning Board's weekly agenda, known as the "pink sheet." A list of the CAC members is found on page v of this Report.

Technical Advisory Committee

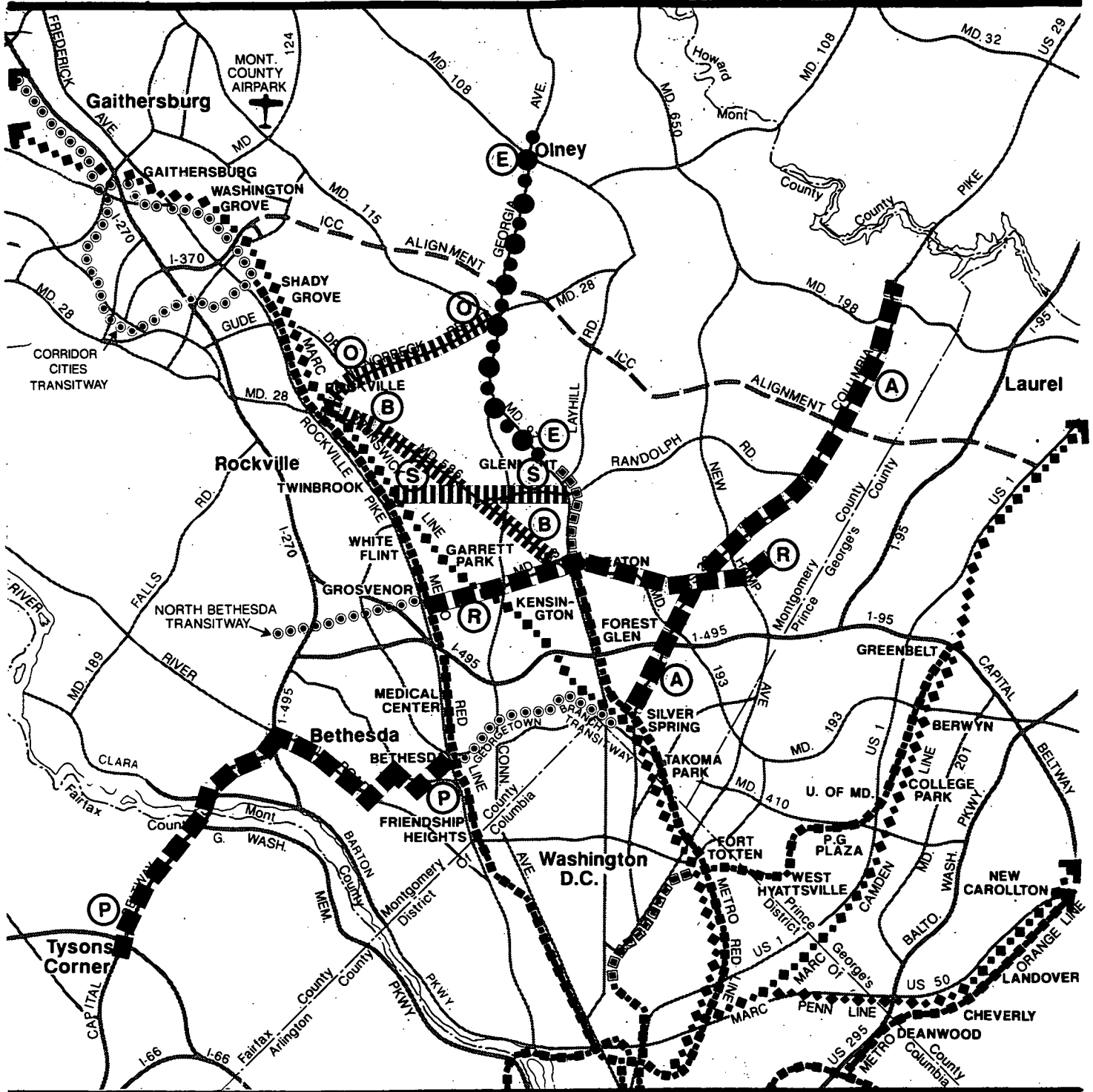
A Technical Advisory Committee (TAC) has been established by the Planning Department and meets once a month. Representatives of several government agencies that have a role in the review of the plan and in the implementation of transitways and HOV lanes assist the Planning Department in the development of this Master Plan. The agencies represented on the TAC are listed on page vi of this document.

Public Outreach

The major public outreach effort will begin after the Alternatives Report has been presented to the Planning Board. At a community forum, the Planning Department staff will present the recommendations of the Alternatives Report and answer questions. Public comment is encouraged at the community forum and at the Planning Board worksession(s) that will be held prior to the Board's action on the recommendations of the Alternatives Report. Alignments can be modified, eliminated, or added during the Planning Board's consideration. The Planning Department staff is also available to meet with groups of community organizations.

Following the approval of the Alternatives Report, the public may also participate in alignment-based community meetings. Adequate information regarding these meetings will be provided through adequate public information channels.

MAP D



RECOMMENDED TRANSITWAY NETWORK

Recommendations

TRANSITWAY TO BE STUDIED BY PLANNING DEPARTMENT



TRANSITWAY TO BE STUDIED BY OTHER AGENCIES



OPERATIONAL IMPROVEMENTS TO BUS SERVICE



Background Transitways

METRORAIL

Existing



Planned



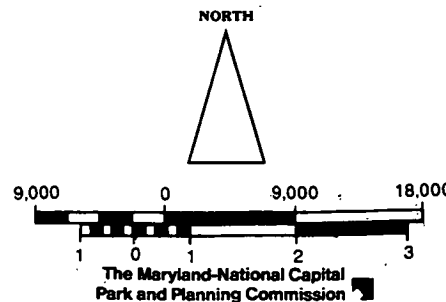
MARC AND VIRGINIA RAIL EXPRESS



TRANSITWAY



TRANSITWAY AND HOV NETWORK MASTER PLAN



2. Transitway Alignments: Evaluation Results

Seventeen of the 19 alignments (listed in Table 3 and shown on Map C) have been evaluated as potential transitways.⁷ This section discusses the seven alignments proposed for further study. The alignments not discussed here are not recommended for further study as transitways.⁸

The seven alignments that comprise the transit network proposed for further study are divided into two groups (Map D):

- four alignments as separate right-of-way transitways,
- three alignments as appropriate for bus service improvements.

Only the evaluations of the four alignments proposed for further study as transitways are presented here. The three alignments proposed for evaluation by other agencies for improvements to the existing bus service are briefly discussed in Section 2.E.

Recommendations

The four alignments are divided into two categories: those to undergo further study by the Planning Department and those to be studied by other agencies or deferred until a later date.

⁷ The two alignments not evaluated as transitways were: Midcounty Highway (M-83) and Clara Barton Parkway/Cabin John Parkway. The Midcounty Highway alignment was not evaluated because it parallels the master-planned Corridor Cities Transitway alignment; the Clara Barton Parkway/Cabin John Parkway alignment was not evaluated because no transit exists there now due to its status as a National Park as well as the fact that its northern end, the Capital Beltway, has no other transit services. Both of these alignments were evaluated HOV alignments as discussed in Section 3 and Appendix C.

⁸ Appendix B (in the Technical Appendix) discusses the criteria and process used to eliminate those alignments not recommended for further study.

Section 2

Planning Department Right-of-Way Delineation

- Georgia Avenue (Alignment E)

One alignment is proposed for further study as transitways by the Montgomery County Planning Department in the development of the Staff Draft Master Plan. The necessary right-of-way will be delineated on 200-scale (one inch = 200 feet) maps. The delineated right-of-way will form the basis for the Staff Draft Master Plan.

Study by Other Agencies or Future Study by Planning Department

- US 29 (Alignment A)
- Bethesda-Tysons Corner (Alignment P)
- Grosvenor-White Oak (Alignment R)

Three alignments are recommended to be studied as transitways by other agencies or are deferred until a later date. A portion of the US 29 alignment is currently being studied by the Montgomery County Department of Transportation (MCDOT). Pending the results of MCDOT's analysis, further planning review of ways to find room for a transitway south of New Hampshire Avenue is unnecessary and redundant. A transitway alignment from Bethesda to Tysons Corner in Fairfax County, Virginia, constitutes a significant regional linkage and should be studied by a regional or state level agency. Finally, as the Grosvenor-White Oak alignment is conceived as an extension of the North Bethesda Transitway, further study of the alignment should wait until the North Bethesda Transitway has been constructed.

Overall Findings

Analysis showed that connections to other transit systems are critical to the success of future transitways in Montgomery County. Each of the four transitway alignments connects to at least one Metrorail station, thereby extending the effective range of the existing high-capacity transit network in Montgomery County and the region. Expanded transit service to Metrorail station areas also bolsters Montgomery County's recognition of Metrorail as both a people-moving service as well as an incentive for development around its stations.

Two of the alignments, US 29 and Georgia Avenue, would provide radial extensions of transit service, while the other two would provide circumferential (east-west) routes generally parallel to the Beltway. One circumferential route, Grosvenor-White Oak, would connect three of the County's primary transit corridors — US 29, Georgia Avenue (east leg of Metrorail Red Line), and Rockville Pike (west leg of Metrorail Red Line). The other, Bethesda-Tysons Corner, would provide a regional connection between the Bethesda Metro station in Montgomery County and a future transit station at Tysons Corner that is part of a transitway recommended by Fairfax County extending from the West Falls Church Metro station to Washington Dulles International Airport.

Furthermore, analysis determined that the alignments that would significantly increase County-wide transit accessibility and respond to significant demand are located in the highly developed portions of the County where the existing rights-of-way are well-used. In the down-county area there are also no continuous strips of land to provide or expand the rights-of-way without potentially creating a significant negative impact on the community and environment.

Organization of Transitway Evaluation Results

The discussion of each of the four alignments proposed for further study as transitways is organized as follows:⁹

- **General Issues:** A narrative of the alignment and an overview of its possible benefits and constraints,
- **Regional Context:** A review of relevant issues and background that affect the alignment,
- **Alignment Alternatives:** A brief discussion of the possible alternatives to the alignment and the conclusions from their evaluation,
- **Performance:** A presentation of the evaluation results of the alignment,
- **Stations:** A brief listing of the stations tested with the alignment. The locations may be changed in response to future studies.

Table 4 and Table 5 present an overview of the performance figures for the four alignments proposed for further study as transitways. The data in each of the tables are also presented in the individual discussion of each alignment. Note that columns 1 and 2 in Table 4 do not correspond to columns 1 and 2 in the discussion of each alignment.

⁹ Section 4 discusses the network ramifications of all four proposed transitway alignments evaluated together as a network. Appendix 4 explains the different measures and the process used to evaluate the alignments. Appendix A reviews this application of the computer transportation model.

Important Points about Table 4

- The figures shown are computer model forecasts, appropriate for this type of long-range broad-brush level planning only. Much more extensive analysis will be necessary for any of the alignments to be carried forward into construction.
- As indicated in column 4, an end-to-end trip on each of the four transitway alignments would be shorter than the corresponding auto trip. Relative travel time is a major factor when a person decides which mode to take. Traditionally, transit systems have been considered to be successful if a transit trip took up to 50% longer than if taken by car.
- Through-routing, or eliminating a transfer between two lines through use of the same technology, has a substantial effect on demand (Column 2) and transit accessibility (column 3).
- Rail demonstrates a significant advantage in demand (column 2) over a busway.
- Increase in column 2 is larger for systems constituting entirely new links, primarily because previous direct service did not exist or was sparse between the endpoints of the alignment.

Summarization of Transitway Evaluation Measures

1. **Length:** The end-to-end length of the transitway in miles.
 2. **2010 Transit Demand Increase on Alignment Due to Transitway:** Percentage increase of transit demand provided by transitway over previous on-street bus service. The transit demand between the two endpoints of the alignment is measured. The relative demand numbers are presented in the individual discussion of each alignment.
 3. **Transit Accessibility:** A measure of the number of households and jobs that are accessible by transit to Montgomery County residents and workers. The higher the increase, the more homes and jobs that can be reached by transit within a certain period of time. (A more extensive definition of accessibility is found in Appendix 4.)
 4. **Time Savings: Transitway vs. Auto:** How much faster a transitway passenger can travel in the peak direction from one end of the alignment to the other than a person driving between the same two points in 2010.
 5. **Time Savings: Transitway vs. Bus Transit:** How much faster a transitway passenger can travel in the peak direction from one end of the alignment to the other than a passenger on an on-street bus in 2010.
-

Table 4
Summary Table
Evaluation Results for Proposed Transitway Alignments

		1. Length (miles)	2. 2010 Transit Demand Increase on Alignment Due to Transitway	3. Transit Accessibility Increase	4. Time Savings: Transitway vs. Auto (minutes)	5. Time Savings: Transitway vs. Bus Transit (minutes)
A.	Georgia Ave. (Busway)	8.7	12%	0-1.5%	12	18
	Georgia Ave. (Rail)	8.7	30%	0-1.5%	12	18
B.	Grosvenor-White Oak (Rail)		88%	0-1.5%		
	Through-route with North Bethesda Transitway	7.2	112%	0-1.5%	14	24
C.	US 29 (Busway)		32%	1.5-3.0%		
	Through-route with Georgetown Branch	12.1	48%	3.0-4.5%	9	14
	US 29 (Rail)		46%	1.5-3.0%		
	Through-route with Georgetown Branch	12.1	66%	3.0-4.5%	9	14
D.	Bethesda-Tysons Corner (Busway)	14.3	255%	1.5-3.0%	20	48
	Bethesda-Tysons Corner (Rail)		300%	1.5-3.0%		
	Through-route with Georgetown Branch	14.3	343%	3.0-4.5%	20	48

All alignments evaluated during the evening peak period (3:30 pm - 6:30 pm).

Table 5
Summary Table
Effects of Proposed Transitway Alignments on Other Transit Systems

		6.	7.	8.	9.	10.	11.
		Metrail Red Line	MARC	Bus*	Georgetown Branch	North Bethesda Transitway	Corridor Cities Transitway
A.	Georgia Avenue (Busway)	0-4%	--	0-4%	(0-4%)	0-4%	--
	Georgia Avenue (Rail)	0-4%	(0-4%)	(0-4%)	(0-4%)	0-4%	0-4%
B.	Grosvenor-White Oak (Rail)	0-4%	--	4-8%	(4-8%)	4-8%	--
	Through-route with North Bethesda Transitway	0-4%	--	4-8%	(8-12%)	4-8%	--
C.	US 29 (Busway)	0-4%	0-4%	4-8%	0-4%	0-4%	--
	Through-route with Georgetown Branch	4-8%	(0-4%)	8-12%	8-12%	4-8%	0-4%
	US 29 (Rail)	4-8%	(4-8%)	(16-20%)	0-4%	0-4%	--
	Through-route with Georgetown Branch	4-8%	(0-4%)	(20+ %)	16-20%	4-8%	--
D.	Bethesda-Tysons Corner (Busway)	0-4%	0-4%	(0-4%)	4-8%	0-4%	--
	Bethesda-Tysons Corner (Rail)	0-4%	0-4%	(0-4%)	4-8%	0-4%	--
	Through-route with Georgetown Branch	(4-8%)	(12-16%)	(8-12%)	20+ %	4-8%	--

() indicates negative effect.

-- indicates negligible effect.

All measurements in percent change of 2010 passenger miles traveled.
Measured during evening peak period (3:30 pm - 6:30 pm).

* Includes impact on both Metrobus and Ride-On service.

A. Georgia Avenue (Alignment E)

General Issues

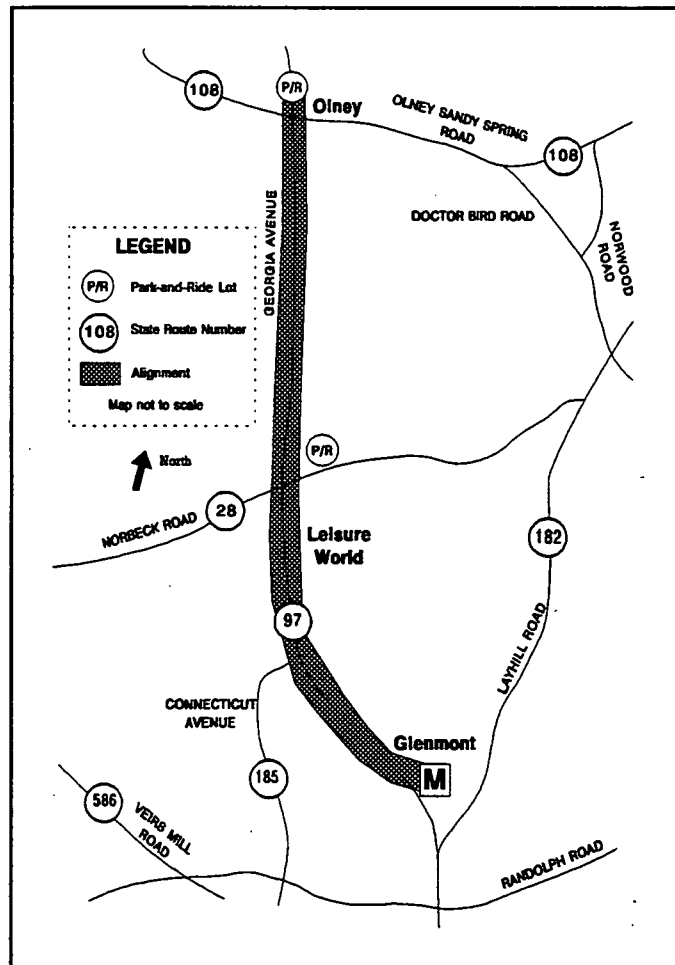
The approved and adopted 1994 *Aspen Hill Master Plan* recommends that a reversible busway be constructed between the Glenmont Metro station and the planning area boundary that would establish a connection with the park-and-ride lot at Norbeck Road (MD 28).

This Report continues the support for a reversible busway along Georgia Avenue. (Figure 3 illustrates its general location.) Bus service is appropriate, given the level of transit demand and the nature of the surrounding land uses. This portion of the County has low-density residential and commercial development.

The development can be served efficiently by buses. Because there are common destinations — the Glenmont Metro station and points south — a busway would improve bus service. Unlike rail transit, buses can leave the transitway and circulate through the residential areas on both sides of an alignment to provide direct access. Rail transit service along Georgia Avenue would also require patrons to either drive or take a bus to a station; the resulting transfer would be a disincentive for transit use.

The alignment is likely to be one of the least difficult to implement as there appears to be sufficient right-of-way for much of the alignment. Additional right-of-way may well need to be acquired at the southern portion of the alignment, the extent and location of which will be determined during the next phases of this planning effort.

Figure 3 Location of Georgia Avenue Alignment



Regional Context

The 1994 Aspen Hill Master Plan discusses the Georgia Avenue Transitway (page 88):

A design study will be necessary to determine design details and operating features. One option to be considered is the construction of the transitway in the median area between the northern and southern ends of the planning area. The studies should include measures to: 1) minimize impacts of the transitway on local circulation, 2) provide access for both local and express buses, and 3) design the transitway within the "green corridor" concept for Georgia Avenue and other elements that are important to efficient operation. Initially, the transitway should be used for express buses only in the southbound direction during the morning rush period and only in the northbound direction during the evening peak period. The use of the transitway as a reversible bus lane would allow more of the median to be landscaped. Ultimately, the busway could be upgraded to accommodate a higher capacity system when warranted by ridership levels. When the Olney Master Plan is re-evaluated, consideration should be given to extending the transitway through Olney.

The Planning Department will study the busway's preliminary engineering constraints and its impact on the community and the environment during the next phase of this planning effort. The busway evaluated in this Report, with stations and transfers, differs from the one in the Aspen Hill Master Plan. It recommended exclusively express service. The exact nature of transit service on the busway will be refined as the planning effort continues.

The Georgia Avenue alignment also crosses the master-planned alignment of the Intercounty Connector (ICC) just north of Norbeck Road. (See [Appendix 3](#) for information on the ICC.) Since the alignment extends to Olney, it would also likely cross any alignment resulting from the ongoing study of the ICC. Regardless of the ICC's location, the ICC/Georgia Avenue intersection will likely be a grade-separated one. Planning for both the transitway alignment and the ICC should take the configuration of this intersection into consideration so that a busway may be accommodated.

The Georgia Avenue alignment has been evaluated twice recently by MDOT. The 1988 Study of the Appropriateness and Applicability of Light Rail Transit in Maryland and the 1990 Statewide Commuter Assistance Study both concluded that light rail was inappropriate for the alignment. However, both also recommended that a reversible busway be studied further in the future.

Alignment Alternatives

Because right-of-way is not a major issue, staff has not explored alternatives to the Georgia Avenue alignment. The location of the busway within the right-of-way will be determined during the next phase.

Performance

The travel value provided by the Georgia Avenue alignment results from the transit vehicles traveling faster than autos on Georgia Avenue. This will be accomplished by placing transit vehicles on an exclusive lane. Current bus service is constrained by congestion on Georgia Avenue. Allowing buses to travel faster than traffic will reduce bus commuting time for residents north of Glenmont who want to ride Metrorail to Wheaton, Silver Spring, and Washington, D.C. (Table 6 shows the results of the evaluation.) The implementation of a busway on this alignment would substantially speed up bus service (column 5). Furthermore, those traveling from Glenmont to Olney via the transitway could reach their destination 12 minutes faster than if they were driving (column 4).

Table 6
Transitway Vehicles Travel Faster Than Cars on Georgia Avenue

1.	2.	3.	4.	5.
2010 On-street Bus Demand (no transitway)	2010 Transitway Demand*	Transit Accessibility Increase**	Time Savings: Transitway vs. Auto (minutes)	Time Savings: Transitway vs. Bus Transit (minutes)
GEORGIA AVENUE AS BUSWAY				
1725	1925	0-1.5%	12	19
GEORGIA AVENUE AS RAIL				
1725	2250	0-1.5%	12	19

Evaluated during the evening peak period (3:30 - 6:30 pm).

* Measured in two-directional passenger miles of travel per mile of the busway (Appendix 4).

** See Appendix 4 for discussion.

Table 7 presents the effect of the alignment on other transit facilities in Montgomery County. As expected, a busway on the Georgia Avenue alignment increases the passenger miles traveled on buses in the County by up to four percent.

Section 2

Also of note, the alignment would increase Metrorail Red Line ridership, also by up to four percent.¹⁰

Rail transit on the Georgia Avenue alignment was also evaluated. As shown in Table 6, it produced no additional time savings and little increase in demand. Limited additional right-of-way will be needed to add an exclusive bus lane to Georgia Avenue. A rail transitway would require more right-of-way than the bus lane since trains must operate in both directions, necessitating two tracks. Further, a busway would significantly reduce the need for transfers as buses could circulate through the neighborhoods before or after using the busway. For those reasons, the rail alternative was not evaluated further.

Table 7
Metrorail Red Line Use Increased with Georgia Avenue Transitway

6.	7.	8.	9.	10.	11.
Metrorail Red Line	MARC	Bus*	Georgetown Branch Transitway	North Bethesda Transitway	Corridor Cities Transitway
GEORGIA AVENUE AS BUSWAY					
0-4%	--	0-4%	(0-4%)	0-4%	--
GEORGIA AVENUE AS RAIL					
0-4%	(0-4%)	(0-4%)	(0-4%)	0-4%	0-4%

() indicates negative effect.

-- indicates negligible effect.

Evaluated during the evening peak period (3:30-6:30 pm).

Measured in the percent change of 2010 passenger miles traveled.

* Includes impact on both Metrobus and Ride-On service.

Stations

The Georgia Avenue busway alignment was tested with fewer stations than if it was proposed for further study as light rail. Buses that circulate through neighborhoods should be able to enter the busway at any intersection with Georgia Avenue. Therefore, the number of stations is not as important as it would be for a facility such as light rail where passengers can only board at the stations. Furthermore, busway use of the stations differs from light rail use: in this analysis, stations on the busway are seen primarily as transfer points rather than boarding and

¹⁰ While the Metrorail range is similar to other effects on other modes, the actual increase in miles traveled is higher due to the greater daily passenger volumes and longer trip lengths of people riding the Red Line.

alighting locations. A bus could drop off passengers anywhere along its route, but the stations listed in Table 8 served as locations where different bus routes branched from Georgia Avenue. Table 8 also the rationale for each station's inclusion. Should the ICC intersect with the alignment at a site other than that indicated on the Master Plan of Highways, a station should also be considered at the relocated intersection.

Table 8
Transfer Points Tested with Georgia Avenue Alignment

Location		Reason
1	Glenmont Metro station	<ul style="list-style-type: none">• Connect with east leg of Metrorail Red Line• Serve residents and retail at Glenmont
2	Connecticut Avenue	<ul style="list-style-type: none">• Serve Aspen Hill central shopping area and neighboring residential communities• Provide convenient bus transfer point to lines on Connecticut Avenue (MD 185)
3	Norbeck Road	<ul style="list-style-type: none">• Park-and-ride lot at northeast corner of Norbeck Road and Georgia Avenue• Provide convenient transfer point for trips to/from Rockville via Norbeck Road (MD 28)• Close proximity to ICC
4	Olney (MD 108)	<ul style="list-style-type: none">• Future park-and-ride lot• Olney retail district

The number and location of these stations may be revised based on future studies.

B. Grosvenor-White Oak (Alignment R)

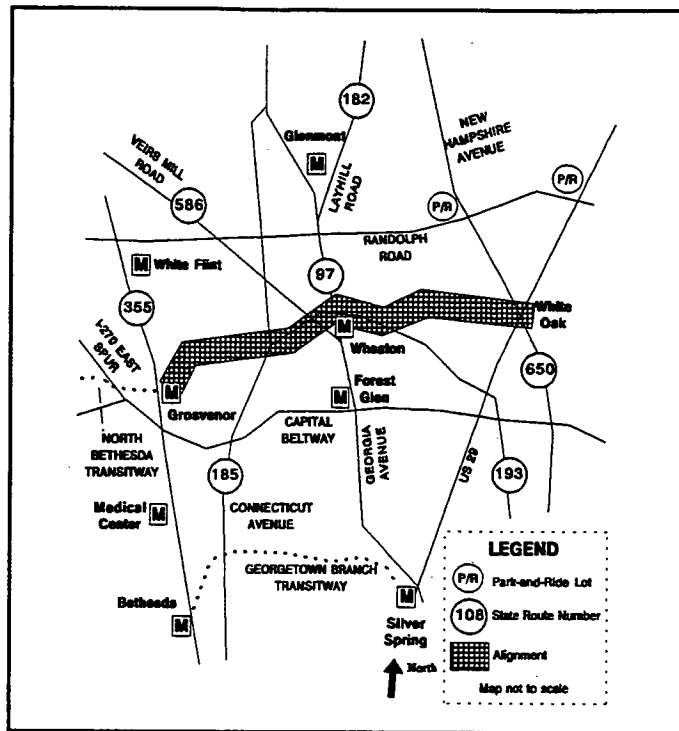
General Issues

The Grosvenor-White Oak alignment (illustrated in Figure 4) would supply a cross-county transit link, connecting the Grosvenor Metro station with the Wheaton Metro station and White Oak at US 29. The Grosvenor-White Oak alignment would provide four substantial services:

- A link between the east and west branches of the Metrorail Red Line,
- Improved transit accessibility for east-west travel,

Figure 4 Location of Grosvenor-White Oak Alignment

- A connection between Eastern Montgomery County and employment opportunities along the I-270 Corridor as well as around Metrorail stations on the east and west branches of the Red Line,
- Additional transit access to the planned North Bethesda Transitway, which would serve employment concentrations in Rock Spring Park.



Developing the alignment will be a challenge. It would cross the environmentally-sensitive stream valleys created by the Northwest Branch and Rock Creek. Plus, as it runs east from Northwest Branch to US 29, it would cross a portion of the Dumont Oaks subdivision.

Discussion of the status of future studies of this alignment is found in [Section 5](#).

Regional Context

The challenging nature of the alignment is reflected in its regional issues and its extensive history, including:

- The status and history of the former US 29 Spur that this alignment parallels between University Boulevard/Arcola Avenue and US 29,
- The relationship between the alignment and the master-planned Georgetown Branch,
- The studies that have documented the need for improved east-west transportation.

US 29 Spur

The right-of-way for the US 29 Spur was on the Master Plan of Highways between 1955 and 1981. Originally, it was to provide roadway access from both US 29 and University Boulevard to the Northern Parkway, a roadway in the Northwest Branch planned in 1955 but never built. The 1981 Eastern Montgomery County Master Plan explained why roadway plans for the US 29 Spur were abandoned (pages 177-178):

...The Route 29 Spur was to provide relief to the Four Corners intersection by diverting traffic from Route 29.... Traffic projections and detailed traffic circulation studies indicated that the Spur, if constructed, would improve the level of service at Four Corners, but would have undesirable impacts in White Oak and in Wheaton that would outweigh the benefits to Four Corners.

Traffic projections and analyses indicated that the Spur, if built, would attract about 25,000 vehicles daily. Traffic diverted from Four Corners would constitute about 48 percent of this volume. The remainder would be traffic diverted from other roads in eastern Montgomery County, particularly Randolph Road. The latter diversion, however, would attract traffic into the White Oak area. Such added traffic would make it difficult to develop the vacant parcels in White Oak, particularly those abutting the New Hampshire Avenue-Route 29 interchange, within a reasonable level of service. The Spur would also add about 13,000 vehicles to the daily traffic load on University Boulevard and Arcola Avenue in Wheaton. The benefit to Four Corners, when weighed against adverse impacts at White Oak and Wheaton, environmental difficulties in crossing Northwest Branch, and the cost of construction, led to eliminating the Route 29 Spur from further consideration.

An at-grade transit alternative was also considered for the US 29 Spur to provide a continuation of a proposed transitway from Burtonsville to Wheaton (page 169):

- Construct a light rail or other exclusive right-of-way transit system to connect Burtonsville with the Wheaton METRO station. This system would use a widened right-of-way along Route 29, and the Route 29 Spur. It would have stops at all major intersections, fringe parking lots, major employment centers, and other appropriate locations.

The other options for US 29 were:

- Reconstruct the roadway as a six-lane freeway from the Howard County Line to the Intercounty Connector, and as a six-lane major highway from the Intercounty Connector to New Hampshire Avenue, allowing all traffic to use all lanes.

Section 2

- Widen the roadway from four lanes to six lanes between the Howard County line and New Hampshire Avenue, operating the two additional lanes as exclusive peak-period bus/carpool lanes.
- Widen the roadway from four lanes to six lanes between the Howard County line and New Hampshire Avenue, allowing all traffic to use all lanes.

After carefully considering the option to use the US 29 Spur for transit, the Planning Board voted against it:

Although projected peak period ridership was in the range considered appropriate for light-rail transit, projected patronage, on a day long basis, could not justify the expenditure of capital and operating funds.... In addition, projections of ridership were within ranges which could be served by a high-level express bus system. Furthermore, it would be difficult to reserve the right-of-way for construction of the light-rail line, when construction would not occur for many years.

The third option — widening US 29 by two lanes between New Hampshire Avenue and the County's northern border — was approved and built, although US 29 tapers to two lanes in each direction just north of MD 198.

The US 29 Spur right-of-way east of Northwest Branch Park was abandoned and a portion of the Dumont Oaks subdivision has been built there. The 150-foot right-of-way for the former US 29 Spur west of Northwest Branch to University Boulevard is owned by the State Highway Administration (SHA).

The US 29 Spur was not singled out in this evaluation process as an east-west link. The Planning Department tested a number of east-west alignments that would connect with US 29. Only one of the alignments used the right-of-way for the US 29 Spur. It was recommended because the 1981 Eastern Montgomery County Master Plan abandoned the right-of-way is, it looked at the Spur from a local perspective as opposed to this Master Plan's County-wide scope. Furthermore, the 1981 Plan's recommendation was based on a different transportation network and a different set of land uses as well as different population and employment bases.

Georgetown Branch

The Georgetown Branch ([Appendix 3](#)) is an integral part of the County's transportation network and the top priority transitway. It is incorporated into the Silver Spring CBD and the Bethesda CBD sector plans. The Planning Department, recognizing that it is the backbone for transitway use, strengthens its role by proposing that transitways at its ends be studied. In analyses, the Georgetown Branch has consistently shown that it would carry more demand than northern east-west transit connections.

While the Grosvenor-White Oak alignment would impact the Georgetown Branch (Table 10, column 9), present and future demand on the Georgetown Branch would continue to warrant a transitway. The people that might be served by both lines are those moving between branches of the Metrorail Red Line. The Grosvenor-White Oak alignment would allow travelers a northern alternative. For instance, those in Aspen Hill who need to reach jobs in Rock Spring Park could use Metrorail by transferring to the Grosvenor-White Oak transitway at Wheaton rather than making the more circuitous trip through Silver Spring and Bethesda. Similarly, those commuting from Gaithersburg to Wheaton would have a much quicker and more direct trip.

Both the Georgetown Branch and the Grosvenor-White Oak transitways would rely a good deal on local access. Each would serve a different local market for three reasons:

- The alignments are functionally farther apart than one would guess by looking at a map. The distance between the transitways varies between 2.5 miles and 3.75 miles. By comparison, the two legs of the Metrorail Red Line are at times 3.75 miles apart, yet each leg has become an independent geographic area.
- Pedestrian movement between the two transitways is blocked by the Beltway, an eight-lane freeway that separates the two transitways. Neighborhoods that once straddled the Beltway have, over the interstate's 30-year life, evolved into separate entities.
- One of the main attractions of the Georgetown Branch is the intensity of land uses at its ends. Bethesda and Silver Spring each has more than 30,000 jobs and more than 5,000 housing units. Current bus and auto travel between the two is intense. No other east-west transitway connection would so directly link the CBDs, so the Georgetown Branch's market remains solid despite the addition of another east-west transit link.

East-West Transportation Studies

Completed studies produced by the Metropolitan Washington Council of Governments (COG) and the Maryland Department of Transportation (MDOT) along with the ongoing ICC and Beltway studies document the inadequacy of Montgomery County's east-west transportation system.

The COG study, *The Potential for Circumferential Transit in the Washington Region*, was completed in mid-1993. The report focused on circumferential transit within the Beltway, giving most of its attention to the Beltway itself. While concluding that circumferential transit systems remain "important options for helping to maintain mobility," the study named only the Bethesda-Silver Spring link (Georgetown Branch). Its single recommendation, however, was qualified with the

Section 2

statement that future policy changes (parking pricing, congestion pricing, and concentrated land use patterns at activity centers) could counter the anticipated low level of circumferential transit demand.

The 1990 Statewide Commuter Assistance Study (SCAS), produced by MDOT was blunt in its characterization of east-west travel. Studying the ICC corridor from Wheaton to Olney and from the I-270 Corridor to Laurel, the study remarked that “The primary transportation problem within the corridor is the lack of east-west roadways and travel opportunities.” The study also looked at the Beltway specifically, noting that “heavy congestion has increased at points where development corridors intersect the Beltway with many interchanges unable to safely serve the high volume of traffic. In particular, truck accidents have been common along the Beltway.”

The most recent publication in the Intercounty Connector (ICC) study, the Preliminary Needs Assessment, also recognizes the ineffectiveness of current and future east-west transportation within Montgomery County. It noted that traffic accident rates on major east-west routes are higher than the statewide average. The study also analyzed the transportation network in the year 2010 without the ICC.¹¹ The results included:

- The number of intersections in the ICC study area at level of service “F” (the most congested) would increase by 83 percent.
- East-west auto travel times would increase by 31 percent to 71 percent depending on the route. On-street buses would be similarly constrained.
- East-west traffic volumes would increase by 33 percent to 56 percent.

The Beltway MIS aims to reduce congestion on the County’s major east-west travel route, the Beltway. It is looking at a number of different transportation alternatives, including HOV lanes, rail transit, and various policies to influence transportation demand. The study’s existence reflects the recognition of the need for improved express circumferential transportation capacity.

Alternatives

Nine different alternatives to this alignment were formed for an east-west transit connection; all of them were north of the Beltway. The alternatives were defined by one of two western points (Metrorail Red Line, west leg), two midpoints (Metrorail Red Line, east leg), and three eastern points (along US 29). After an extensive evaluation (Appendix 4), the Grosvenor-White Oak alignment proved the most viable from a demand perspective.

¹¹ From “Intercounty Connector Study Preliminary Needs Assessment,” February 1994 DRAFT.

Performance

Because the Grosvenor-White Oak alignment ties together legs of the Metrorail Red Line, it will have a significant impact on Metrorail use. The three activity centers — Grosvenor, Wheaton, and White Oak — that this alignment connects should provide a stable base of ridership. (The demand forecast for the alignment is presented in Table 9.) The 88 percent (112 percent when through-routed) increase in transit demand projected for the alignment by the year 2010 demonstrates a substantial need for east-west travel. The transitway would improve transit service from White Oak to Grosvenor by 24 minutes (column 5); similarly, the passengers on the transitway could travel from White Oak to Grosvenor 14 minutes faster than auto traffic (column 4). Both increases arise primarily from the creation of a new connection between White Oak and University Boulevard.

The effect of the proposed transitway on existing or master-planned transitways is seen in Table 10. As expected, Metrorail ridership would increase (column 6), and there would also be a demonstrable increase on North Bethesda Transitway (column 10). If it were directly connected (through-routed) to the North Bethesda Transitway, travel on the Grosvenor-White Oak alignment would be expected to increase by as much as ten percent.

As noted earlier, the Grosvenor-White Oak alignment would compete with the Georgetown Branch, another east-west route that connects activity centers of greater magnitude (column 9). The competition increases with the through-routing option. Even so, this alignment would not affect the viability of the Georgetown Branch Transitway. The projected transit demand on both further emphasizes the need for enhanced east-west transit.

Table 9

Connecting North Bethesda Transitway with White Oak More Than Doubles Transit Travel Between Them

Through-routing Options	1. 2010 On-street Bus Demand (no transitway)	2. 2010 Transitway Demand*	3. Transit Accessibility Increase**	4. Time Savings: Transitway vs. Auto (minutes)	5. Time Savings: Transitway vs. Bus Transit (minutes)
No through-routing	1025	1925	0-1.5%		
North Bethesda Transitway	1025	2175	0-1.5%	14	24

Evaluated during the evening peak period (3:30 - 6:30 pm).

* Measured in passenger miles of travel per mile of the transitway (Appendix 4).

** See Appendix 4 for definition of transit accessibility.

Table 10

Grosvenor-White Oak Connection Improves Metrorail and North Bethesda Transitway

Through-routing Options	6. Metrorail Red Line	7. MARC	8. Bus*	9. Georgetown Branch Transitway	10. North Bethesda Transitway	11. Corridor Cities Transitway
No through-routing	0-4%	--	4-8%	(4-8%)	4-8%	--
North Bethesda Transitway	0-4%	--	4-8%	(8-12%)	4-8%	--

() indicates negative effect.

-- indicates negligible effect.

Measured in percent change of 2010 passenger miles traveled.

Evaluated during evening peak period (3:30 pm - 6:30 pm).

* Includes impact on both Metrobus and Ride-On service.

Stations

The recommended alignment was evaluated with five stations (Table 11). It is likely that the three stations with connections to other facilities — the Wheaton and Grosvenor Metro stations and the connection to a US 29 bus transit or transitway — would generate the most demand. Up to seven stations on the alignment were tested; five, placed strategically to attract demand without slowing service, proved to be the optimal number.

Table 11
Stations Tested with Grosvenor-White Oak Alignment

	Location	Reasons
1	Grosvenor Metro station/North Bethesda Transitway station	<ul style="list-style-type: none">• Connect with west leg of Metrorail Red Line• Provide access to nearby high-rise residential buildings• Increase accessibility to Rock Spring Park (15,000 jobs) and Montgomery Mall
2	Corner of Connecticut Avenue and Knowles Avenue	<ul style="list-style-type: none">• Connect with nearby MARC station• Provide access to Kensington area
3	Wheaton Metro station	<ul style="list-style-type: none">• Connect with east leg of Metrorail Red Line• Provide access to employment (9,000 jobs) and housing (1,800 units) opportunities in CBD
4	Corner of Arcola Avenue and University Boulevard	<ul style="list-style-type: none">• Provide access to nearby high-rise residential buildings
5	White Oak (south of US 29 and east of New Hampshire Avenue at shopping center)	<ul style="list-style-type: none">• Provide access to nearby high-rise residential buildings and shopping center• Connect with recommended US 29 transitway

The number and location of these stations may be revised based on future studies.

C. US 29 (Alignment A)

General Issues

The US 29 alignment, seen in Figure 5, is one of the two with the greatest potential as a transitway. Bus service currently links the east branch of the Metrorail Red Line, the Brunswick line of MARC, and other bus routes. The MARC station is to be moved next to the Metrorail station, forming the Silver Spring Multimodal Transit Center. The eastern terminal of the Georgetown Branch Transitway, which is to run between Silver Spring and Bethesda, will be built in the Multimodal Transit Center.

Section 2

Transit use on US 29, provided by Ride-On, Metrobus, and privately operated buses, is presently the highest in the County among areas without rail service. Fifty-six buses currently use US 29 to reach the Silver Spring Metro station during the morning peak hour; of these, 30 provide express service. The intensity of transit use has been present for some time on US 29, and the likelihood that the area is underserved by transit and that it lacks sufficient incentives for substantial carpooling has prompted a number of studies during the past 15 years.

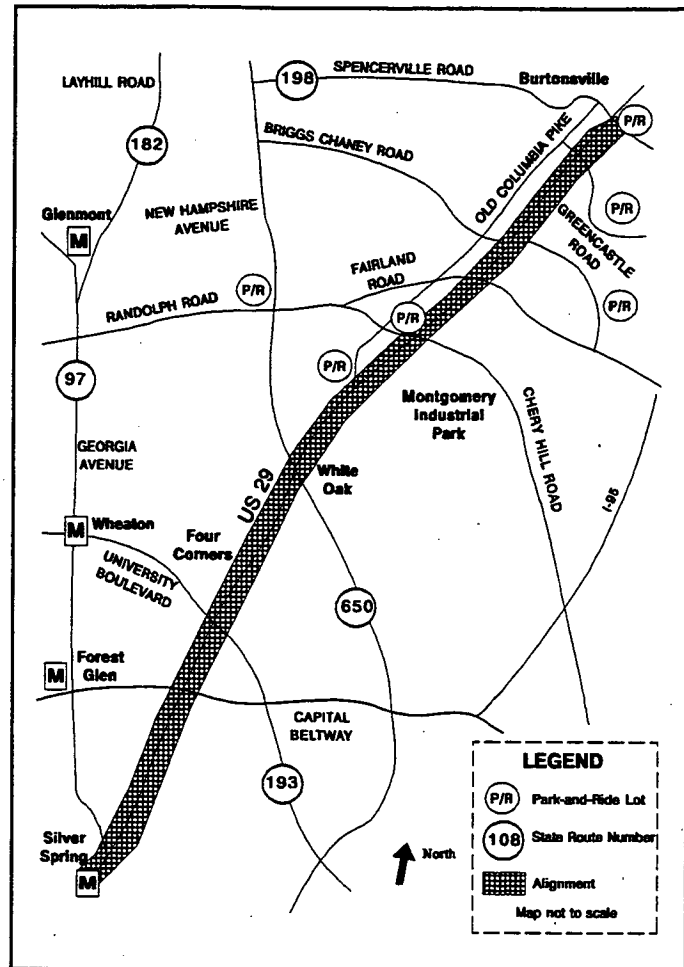
All of the studies have concluded that there is sufficient demand for exclusive right-of-way transit, either a busway or light rail line. But they also concluded that the section of US 29 between Sligo Creek Parkway and the Silver Spring Metro station has far too many constraints to construct an at-grade transportation facility. Both sides of US 29 lack space; buildings come to the sidewalk in many places. Tunneling under US 29 between Sligo Creek Parkway and the Silver Spring Metro station was estimated in 1990 to cost many millions of dollars.

For a transitway to be built along US 29, the County and state governments must set transit service along US 29 as a priority. Furthermore, it would also be helpful if policies to support transit use rather than auto use were adopted — increasing parking charges and limiting parking availability at employment locations as well as additional gasoline taxes.

The interchanges proposed by SHA north of New Hampshire Avenue will improve bus and auto travel time. But the constraints south of New Hampshire Avenue (MD 650), particularly south of Sligo Creek Parkway, will continue to hamper travel by all vehicles to Silver Spring and into Washington, D.C.

The Planning Department recognizes that developing a transitway along US 29, particularly inside New Hampshire Avenue, would be difficult. The Planning

Figure 5 Location of US 29 Alignment



Department, in coordination with the Montgomery County Department of Transportation (MCDOT) and MDOT, should continue to investigate operational alternatives that would provide improved transit service between the Silver Spring Metro station and Burtonsville at MD 198. However, without significant policy changes, no other major analysis is seen as currently worthwhile.

Regional Context

Over the past 15 years, US 29 has been studied more than any other Montgomery County road except for I-270. The constant study stems from the route's endemic congestion, which is most severe south of New Hampshire Avenue. A number of intersections along US 29 currently have an "F" level of service, the most congested rating.

1985-1990: State Highway Administration (SHA) Environmental Impact Statement

In the mid-1980s, SHA undertook a project planning study of US 29. It prepared a Final Environmental Impact Statement (FEIS) that was recently submitted to the Federal Highway Administration (FHWA) Administrator. The FEIS reviewed a number of different alternatives and alternative variations for US 29 from Sligo Creek Parkway to the Howard County line, including:

- A. No-build: including only programmed improvements,
- B. At-grade improvements: intersection improvements including the jughandle configuration at Four Corners,
- C. Grade-separations: constructing interchanges at major intersections and/or creating service roads,
- D. HOV: separated lane reserved for HOVs and buses in the existing median.

As part of that SHA project planning study, MDOT released a report in 1988 titled Comparative Analysis of Transit Alternatives for US 29, revising it in 1990 to reflect more up-to-date land use forecasts. Its purpose was to discuss "critical issues of the transit alternatives and to establish fair standards by which the options can be compared." The report concluded that a "busway remains the most cost effective large scale transit solution for the US 29 corridor." The busway would operate in the US 29 median north of New Hampshire Avenue and in the stretch of highway between New Hampshire Avenue and Sligo Creek Parkway. South of Sligo Creek the transit vehicles would join other traffic within the existing right-of-way.

1988: Applicability of Light Rail Transit

As a requirement for funding design of the Baltimore Central light rail line, the Maryland legislature required in 1988 that MDOT analyze all corridors in the state for which light rail transit might be appropriate. One of these was between Silver Spring and Baltimore along US 29. The study concluded that sufficient

Section 2

demand for light rail between Silver Spring to Burtonsville would exist by the year 2010. The study also recommended further study of HOV/bus lanes on US 29.

1990: Statewide Commuter Assistance Study

The SCAS, completed by MDOT in 1990, evaluated US 29 between I-70 near Ellicott City and the Silver Spring Metro station. It looked at the congested conditions and the potential impact of population and employment growth on the area. It studied several alternatives for the Montgomery County section of US 29:

- express bus service,
- widening the interchange at New Hampshire Avenue and grade-separating intersections north of New Hampshire Avenue,
- light rail from Silver Spring to Burtonsville, with a possible extension to Columbia,
- HOV/bus lanes from Silver Spring to Burtonsville, possibly extended to Columbia.

The SCAS concluded that the interchanges north of New Hampshire Avenue should be constructed, express bus service should be expanded, and HOV/bus lanes should be constructed from Burtonsville to Silver Spring.

Current: Area Master Plans and Sector Plans

Outside the Beltway, US 29 is within the boundaries of the Fairland, White Oak, and Four Corners planning areas; all of these master plans are in the process of being revised. US 29 is one of the most important transportation facilities in all of the plans. In addition, the Cloverly Master Plan, also being revised, is related to US 29 via New Hampshire Avenue.

The 1981 Eastern Montgomery County Master Plan reviewed several options for US 29, including:

- the addition of two peak-period HOV-only lanes,
- the addition of two lanes for all traffic,
- the addition of two lanes for all traffic and construction of interchanges at all intersections north of the ICC,
- the construction of a light rail line or other exclusive transitway from Burtonsville to the Wheaton Metro station.

The 1981 Plan recommended the addition of two general-use lanes north of New Hampshire Avenue. Furthermore, various aspects of US 29 have been studied as part of the 1986 Four Corners Sector Plan and the 1993 Silver Spring CBD Sector Plan.

Current: Exclusive Bus Lane

MCDOT is directing a consultant study to examine the feasibility of an exclusive reversible bus lane on US 29. The boundaries of the study area are Sligo Creek Parkway to the south and Stewart Lane (near New Hampshire Avenue) to the north. The study is expected to be completed in 1996.

Current: Georgetown Branch

The Maryland Mass Transit Administration (MTA) is heading a Major Investment Study/Draft Environmental Impact Statement (MIS/DEIS) for the Georgetown Branch Transitway in close consultation with the Planning Department and MCDOT. The MIS/DEIS will review the alternatives and weigh the impact for constructing the Georgetown Branch Transitway between Silver Spring and Bethesda. The study will determine the mode of transit — light rail, electric bus, or other.

Current: Silver Spring Multimodal Transit Center

The Silver Spring Multimodal Transit Center Study, also led by MTA, is looking at the integration of Metrorail, MARC, and Georgetown Branch Transitway stations as well as bus transfer facilities into one transit center. The combination of these transit activities at one place would reduce the time needed to transfer between modes.

Alternatives

No alternatives to the US 29 alignment were studied. The pattern of transit demand in the area has been consistent for some time and it will remain so.

Performance

Of the four alignments recommended for further study as transitways, US 29 consistently shows the greatest forecast demand. While the demand appears sufficient to support further study of rail transit service, no specific mode is recommended at this time. Either a light rail line or a busway would serve the transit demand along US 29. Results are presented here from both rail and busway evaluations of the US 29 alignment.

Table 12 presents the results. Notably, either mode provides improvements of nine and 14 minutes, respectively, over parallel auto traffic and on-street bus service for the year 2010 (columns 4 and 5). The accessibility increases are among the highest of any alignment tested in this analysis. Furthermore, a transitway provides a substantial improvement over on-street bus demand, from 32 to 66 percent depending on the mode used (difference between columns 1 and 2).

Table 12
Transitway on US 29 Significantly Boosts Transit Demand

	1.	2.	3.	4.	5.
Through-routing Options	2010 On-street Bus Demand (no transitway)	2010 Transitway Demand*	Transit Accessibility Increase**	Time Savings: Transitway vs. Auto (minutes)	Time Savings: Transitway vs. Bus Transit (minutes)
US 29 AS BUSWAY					
No through-routing	3375	4450	1.5-3.0%		
Georgetown Branch	3375	5000	3.0-4.5%	9	14
US 29 AS RAIL TRANSIT					
No through-routing	3375	4925	1.5-3.0%		
Georgetown Branch	3375	5600	3.0-4.5%	9	14

Evaluated during the evening peak period (3:30 - 6:30 pm).

* Measured in passenger miles of travel per mile of the transitway (Appendix 4).

** See Appendix 4 for definition of transit accessibility.

Table 13
US 29 Has Strong Effect on Georgetown Branch and Metrorail

	6.	7.	8.	9.	10.	11.
Through-routing options	Metrorail Red Line	MARC	Bus*	Georgetown Branch Transitway	North Bethesda Transitway	Corridor Cities Transitway
US 29 AS BUSWAY						
No through-routing	0-4%	0-4%	4-8%	0-4%	0-4%	--
Georgetown Branch	4-8%	(0-4%)	8-12%	8-12%	4-8%	0-4%
US 29 AS RAIL TRANSIT						
No through-routing	4-8%	(4-8%)	(16-20%)	0-4%	0-4%	--
Georgetown Branch	4-8%	(0-4%)	(20+ %)	16-20%	4-8%	--

() indicates negative effect.

-- indicates negligible effect.

Measured in percent change of 2010 passenger miles traveled.

Evaluated during evening peak period (3:30 pm - 6:30 pm).

* Includes impact on both Metrobus and Ride-On service.

Table 13 shows the impact of the US 29 alignment on existing and master-planned transit facilities in the County. A US 29 rail alignment would have a significant effect on the Georgetown Branch Transitway, particularly with the through-routing option. The Georgetown Branch effect was expected because both Bethesda and Silver Spring are focal points for employment, retail, and housing. The expectation was borne out by a 13 percent increase in demand on US 29, nine percent when both modes are through-routed (column 3). This alignment connection also spurs an increase of nearly 20 percent on the Georgetown Branch (column 9).

Both US 29 rail options significantly reduce the passenger miles traveled on bus in Montgomery County — over 16 percent (column 8). This is to be expected, because bus travel on US 29 is nearly 25 percent of the entire County's bus travel.¹² Thus, replacing buses with rail transit service represents a shift of funds for bus operations and personnel to rail service rather than a decrease in transit use.

The US 29 rail alignment would also boost County-wide Metrorail ridership between four and eight percent (column 6). This represents a substantial increase.

Stations

Ten stations between Burtonsville at MD 198 and the Silver Spring Metro station were incorporated in the evaluation. The same stations (Table 14) were used to evaluate the busway and rail transit options.

¹² These figures are for the forecast year 2010 between Silver Spring and Burtonsville without a transitway or HOV facility on US 29.

Table 14
Stations Tested with US 29 Alignment

Location		Reason
1	MD 198	<ul style="list-style-type: none">• Burtonsville retail and business center
2	Greencastle Road	<ul style="list-style-type: none">• Residential development
3	Briggs Chaney Road	<ul style="list-style-type: none">• Connect with master-planned alignment of the ICC• Shopping center• Residential development
4	Fairland Road	<ul style="list-style-type: none">• Residential development
5	Randolph Road	<ul style="list-style-type: none">• Residential development
6	White Oak (New Hampshire Avenue)	<ul style="list-style-type: none">• High-rise residential development• Employment opportunities• Shopping center
7	Hillwood	<ul style="list-style-type: none">• Residential development
8	Four Corners (University Boulevard)	<ul style="list-style-type: none">• Retail opportunities• Montgomery Blair High School• Potential Four Corners Transit Center
9	Fenton Street	<ul style="list-style-type: none">• Shopping center and street-level retail
10	Silver Spring Metro station	<ul style="list-style-type: none">• Connection to Metrorail, MARC, Georgetown Branch, and buses at future Silver Spring Multimodal Transit Center• Concentration of nearby jobs and housing

The number and location of these stations may be revised based on future studies.

D. Bethesda-Tysons Corner (Alignment P)

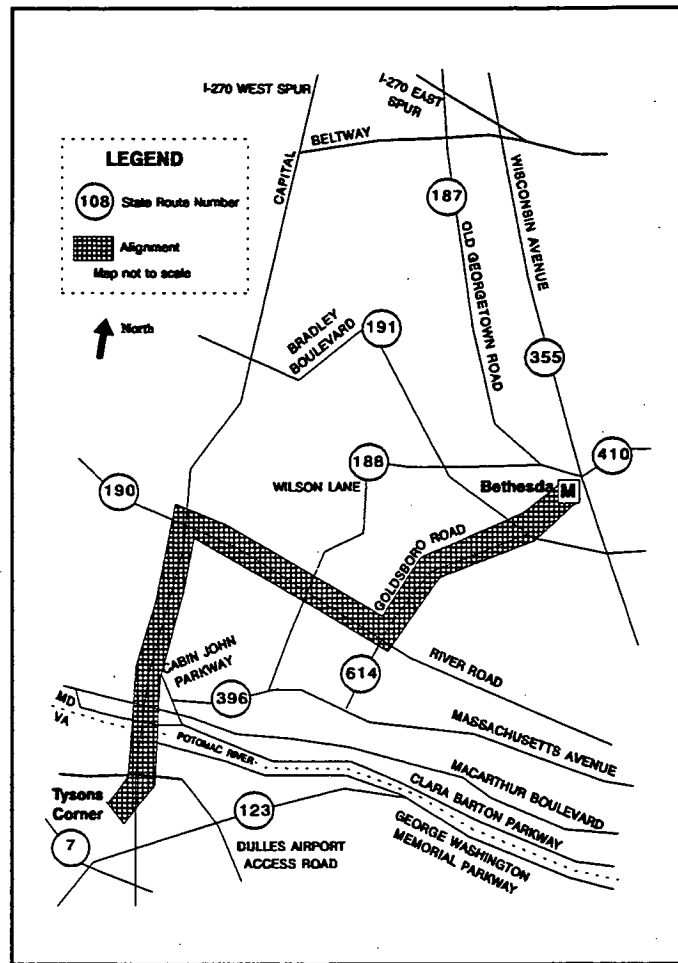
General Issues

The Bethesda-Tysons Corner alignment would provide a connection between major activity centers in Montgomery and Fairfax Counties ([Figure 6](#)). The Silver Spring-Bethesda link provided by the Georgetown Branch in Montgomery County can be substantially augmented by linking Bethesda with Tysons Corner and, via the rail transit line proposed by Fairfax County, with other centers in the Dulles corridor. The regional connection creates a very strong commuter link, and it holds substantial potential for midday and weekend service. As a commuter link, its performance is similar to the alignment on US 29. This Report recommends it for further study by the Washington Metropolitan Area Transit Authority (WMATA), perhaps within the

Figure 6 Location of Bethesda-Tysons Corner Alignment

scope of its review of Metrorail system expansion. Future long-range network plans by MDOT should also consider the regional link.

As with the US 29 alignment, the demand on the Bethesda-Tysons Corner alignment appears sufficient for further study of rail transit service. A particular type of rail transit has not been recommended; light rail or heavy rail could be appropriate. A busway on this alignment would attract significant demand also. The specific mode of this alignment would depend in large part on the modes used at its ends. A transit line between the West Falls Church Orange Line Metro station, Tysons Corner, and Dulles Airport could use heavy or light rail. The mode for the Georgetown Branch Transitway is currently under study and could support a light rail line or a busway.



An at-grade alignment would create significant community and environmental impact, particularly along the portion of the alignment between the Bethesda Metro station and River Road. Land is very limited; the transitway may have to be built above or below ground.

Regional Context

The portion of River Road (MD 190) used by the alignment is discussed in the 1990 Bethesda-Chevy Chase Master Plan. That area master plan states that widening River Road to six lanes may be necessary in the next 20 years.

Fairfax County adopted the Tysons Corner Urban Center Plan in mid-1994. That plan proposes a sweeping re-organization of building setbacks designed to encourage pedestrian access and mixed-use development. It plans for an increase in the amount of housing and lends strong support to future heavy or light rail transit. The Dulles Corridor Task Force Preliminary Report, released in February 1994, examines the land use impact of three separate transit approaches around eight

Section 2

possible transit stations, including three in Tysons Corner. The implementation of transit to Tysons Corner would bolster the regional transit connection of the Bethesda-Tysons Corner alignment.

In 1993, COG released a report on the need for suburb-to-suburb transit. The report, *The Potential for Circumferential Transit*, concluded that, while 56,000 people would drive on the Beltway from Tysons Corner to North Bethesda, the only circumferential transitway that would attract adequate demand was the link between Bethesda and Silver Spring (the Georgetown Branch). It should be noted, however, that the link COG tested between Montgomery County and Tysons Corner ran along on the Beltway and connected with less-dense North Bethesda.

Alignment Alternatives

Two alternatives to this alignment were also tested (Appendix 4). While one of the alternatives — traveling from Bethesda to Tysons Corner in a relatively straight line — attracted more demand due to its quicker trip, the necessity for a new Potomac River crossing precluded its recommendation.

Performance

The Bethesda-Tysons Corner Alignment tests as either the best or the second-best of the alignments recommended for further study as transitways. (Table 15 presents performance results.) The most striking effect is the travel time savings: a passenger on the Bethesda-Tysons Corner transitway would travel 20 minutes faster than auto traffic and 48 minutes faster than on previously existing transit service (columns 4 and 5). County-wide accessibility improvements are also strong (column 3).

Through-routing with the Georgetown Branch Transitway at Bethesda would provide transit between Silver Spring and Tysons Corner without a transfer at Bethesda. Modifying the connection in this way increases demand between Bethesda and Tysons Corner by more than 10 percent.¹³

Table 16 presents the effect of the Bethesda-Tysons Corner alignment on other transit services. There is a significant effect on the Georgetown Branch, particularly when the alignment is through-routed (column 9). This indicates a strong demand for circumferential travel between Montgomery County and Northern Virginia.

¹³ Other options for through-routing, particularly when the eastern end of the Georgetown Branch is through-routed to a facility of similar technology on US 29, are discussed in Section 4.

Table 15
Alignment Substantially Increases Transit Demand Between Bethesda and Tysons Corner

Through-routing Options	1. 2010 On-street Bus Demand (no transitway)	2. 2010 Transitway Demand*	3. Transit Accessibility Increase**	4. Time Savings: Transitway vs. Auto (minutes)	5. Time Savings: Transitway vs. Bus Transit (minutes)
BETHESDA - TYSONS AS BUSWAY					
No through-routing	1225	4350	1.5-3.0%	20	48
BETHESDA - TYSONS AS RAIL					
No through-routing	1225	4900	1.5-3.0%	20	48
Georgetown Branch	1225	5425	3.0-4.5%		

All measurements are during the evening peak period (3:30 pm - 6:30 pm).

* Measured in passenger miles of travel per mile of the transitway (Appendix 4).

** See Appendix 4 for definition of transit accessibility.

Table 16
Georgetown Branch, Metrorail Beneficiaries of Bethesda-Tysons Corner Alignment

Through-routing Options	6. Metrorail Red Line	7. MARC	8. Bus*	9. Georgetown Branch	10. North Bethesda Transitway	11. Corridor Cities Transitway
BETHESDA - TYSONS AS BUSWAY						
No through-routing	0-4%	0-4%	(0-4%)	4-8%	0-4%	--
BETHESDA - TYSONS AS RAIL						
No through-routing	0-4%	0-4%	(0-4%)	4-8%	0-4%	--
Georgetown Branch	(4-8%)	(12-16%)	(8-12%)	20+ %	4-8%	--

(-) indicates negative effect.

-- indicates negligible effect.

Measured in percent change of 2010 passenger miles traveled.

Evaluated during evening peak period (3:30 pm - 6:30 pm).

* Includes impact on both Metrobus and Ride-On service.

Section 2

Stations

Although the alignment is one of the longer ones (14.3 miles), it was evaluated with only one more station than the Grosvenor-White Oak alignment (7.2 miles). The alignment provides point-to-point service rather than service to many locations along its path. (Stations are listed in Table 17.)

Table 17
Stations Tested with Bethesda-Tysons Corner Alignment

Location		Reason
1	Bethesda Metro station	<ul style="list-style-type: none">• Connection to west leg of Metrorail Red Line and western terminus of Georgetown Branch• Employment opportunities and dense residential area in CBD
2	Bradley Boulevard and Arlington Road	<ul style="list-style-type: none">• Residential development
3	River Road and Goldsboro Road	<ul style="list-style-type: none">• Residential development
4	Dulles Toll Road	<ul style="list-style-type: none">• Connection to Dulles Corridor Transitway with possible park-and-ride lot
5	Tysons Corner	<ul style="list-style-type: none">• 70,000 jobs and two regional malls
6	West Falls Church Metro station	<ul style="list-style-type: none">• Connection to Metrorail Orange Line

The number and location of these stations may be revised based on future studies.

E. Alignments Recommended for Bus Service Operational Improvements

Three alignments show adequate transit demand to be evaluated further. But they do not generate enough demand to outweigh the negative community and environmental impact a transitway would entail.

- Glenmont-White Flint (Alignment S)
- Veirs Mill Road (MD 586) (A portion of Alignment B)
- Norbeck Road (MD 28) (A portion of Alignment O)

The alignments are recommended for further study by the appropriate agencies to determine the applicability of technological and service improvements. These improvements could include:

- Signal pre-emption: Devices that override traffic signals to let buses move through intersections more quickly. The technology is in limited use in Baltimore and other areas of the country.
- Queue jumpers: Extra lane at congested areas — usually intersections — to be used only by certain vehicles, such as buses. Queue jumpers would allow buses to bypass traffic backups and congestion. The shoulder HOV lanes for buses along US 29 between Randolph Road and MD 198 are used by buses as queue jumpers.
- Expanded or more frequent service: Extending existing service into adjacent neighborhoods and running more buses on existing routes.
- Amenities: More bus shelters, detailed route schedules at bus stops, estimated time of arrival technology.



3. HOV Alignments: Evaluation Results

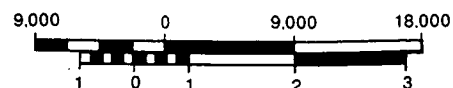
Three types of HOV facilities were evaluated. The Planning Department initially focused on five long-haul alternatives. During the course of the long-haul evaluation, however, staff identified two other HOV configurations, the spur and shared HOV facilities. Neither was mentioned in the Issues Report. Spur HOV facilities would connect activity centers to long-haul HOV routes, such as the Beltway or I-270. A shared HOV facility would allow buses and other HOVs to share a separate and exclusive right-of-way. The recommended network formed by HOV facilities is shown on Map E.¹⁴

Overall Findings

While the HOV recommendations of this Report can provide substantial carpool time-savings, HOV lanes on adjacent freeways will significantly benefit carpoolers and augment their demand. The recommended spur HOV lanes are entirely dependent on an HOV facility on the Beltway. The recommended long-haul HOV facility attracts sufficient demand without supporting freeway HOV lanes, but the demand is enhanced by HOV lanes on I-270 and the Beltway. Without these two HOV freeways, people may not form and maintain carpools because the effort to form them will outweigh their benefit. Therefore, the implementation of HOV facilities on both I-270 and the Beltway are a crucial first step toward the construction of an HOV network.

¹⁴ For more information, Appendix C describes in greater detail the distinctions between the three facility types as well as the methodology used to evaluate HOV alignments.

This map illustrates the proposed Interstate 495 (I-495) and Interstate 270 (I-270) alignments in the Washington, D.C. metropolitan area. The I-495 alignment is shown as a dashed line, while the I-270 alignment is shown as a solid line. The map includes major roads such as I-270, I-495, I-95, and various state and federal highways. Key locations marked include Gaithersburg, Olney, Bethesda, and Washington D.C. The map also shows the Potomac River and the Capital Beltway (I-495). The map is titled "Map of the Washington, D.C. area showing proposed Interstate 495 (I-495) and Interstate 270 (I-270) alignments." and is attributed to the "U.S. Department of Transportation, Federal Highway Administration, Office of Research and Development, Washington, D.C.".



**The Maryland-National Capital
Park and Planning Commission**

A. Long-Haul HOV Facilities

Long-haul HOV lanes are the most common around the country. They exist primarily on freeways or other limited-access roadways and carry traffic at high speeds. Most often, such as the two reversible HOV lanes on I-395, a long-haul facility gathers carpools in suburban areas and carries them to the central city or to one or more activity centers. One of the long-haul HOV lanes tested in this analysis fit the description while the others would potentially provide time-savings for carpools along well-traveled routes.

Recommendations

- **Clara Barton Parkway and Cabin John Parkway (Alignment Q)**

This is the only long-haul HOV facility proposed to be added to the HOV facilities programmed or under consideration by MDOT. The parkway would provide a direct link between the Beltway and employment opportunities in the Georgetown and Foggy Bottom areas of Washington, D.C. The importance of this roadway as a commuting link has already been recognized: during the morning and the afternoon commuting periods, traffic is limited to the peak direction.

Limiting commuting use to vehicles with two or more occupants (HOV 2+) significantly increases accessibility for residents of Montgomery County who work in the District. County-wide accessibility would improve more from the Clara Barton Parkway/Cabin John Parkway alignment than from any other HOV alignment: HOV accessibility increased by nearly six percent (Table 18). The parkway would carry fewer vehicles yet transport more people: the person volume of the alignment would improve by 12.5 percent while the vehicle volume would decline by nearly half. Speed would also improve by 10 mph.

The National Park Service is concerned that the HOV restriction would limit access to the C & O Canal National Park for people to fish or picnic. Establishing the enforcement for HOV restrictions at the points of entry to the Parkway would be one means to alleviate this concern.

Directly linking HOV facilities on the Beltway and I-270 to Washington, D.C. would be a further incentive to carpool. Computer modeling of the Clara Barton/Cabin John alternative indicates that HOV use on the west spur of I-270 and on the Beltway would increase.

Table 18
Long-haul HOV Evaluation Results

		WITHOUT HOV			WITH HOV				Change in County-wide HOV Accessibility
		Peak General Use	Off-peak General Use	P E R S O N V O L U M E	Peak General Use	Peak HOV	Off-peak General Use	Off-Peak HOV	
Clara Barton Parkway/ Cabin John Parkway	Vehicles (lane/hour)	1000	::		::	550	::	::	4.5-6.0%
	Lanes	1	::	1100	::	1	::	1250	
	Speed	26	::		::	36	::		
US 29 Beltway to New Hampshire	Vehicles (lane/hour)	1250	875		1400	800	1025	325	0-1.5%
	Lanes	3	3	7000	2	1	2	1	
	Speed	23	29		14	30	24	37	
New Hampshire to MD 198	Vehicles (lane/hour)	1350	850		1750	1050	1125	550	
	Lanes	4	4	9675	3	1	3	1	
	Speed	24	46		26	48	46	54	
Ridge Road (MD 27)	Vehicles (lane/hour)	1425	475		1400	400	800	::	(0-1.5%)
	Lanes	2	2	4200	2	1	1	::	
	Speed	19	35		20	37	20	::	
Midcounty Highway (M-83)	Vehicles (lane/hour)	575	325		700	250	525	175	1.5-3.0%
	Lanes	2	2	1975	1	1	1	1	
	Speed	35	37		23	38	36	38	
River Road (MD 190)	Vehicles (lane/hour)	275	250		300	350	275	::	0%
	Lanes	1	1	575	1	1	1	::	
	Speed	37	37		37	36	37	::	

() indicates negative effect.

:: indicates the lack of a directional lane.

"Peak" and "Off-peak" refer to the direction of the traffic.

Evaluated during the evening peak hour.

For background on these measurements, see [Appendix C](#).

The following alignments were evaluated as long-haul HOV facilities but are not recommended for further study:

- **Ridge Road (MD 27) (Alignment N)**

This alignment was suggested by the CAC as an HOV facility. It would neither increase accessibility nor generate significant demand for HOV. I-270 will serve much of the north-south HOV demand between Frederick County and Montgomery County as well as that traveling into Washington, D.C.

- **River Road (MD 190) (Alignment G)**

The alignment was included in the Issues Report and was evaluated as an HOV facility. The evaluation found no change in HOV accessibility and no increase in travel speed that would justify the construction of an additional lane.

- **Midcounty Highway (M-83) (Alignment J)**

For much of its length, the Midcounty Highway (M-83) duplicates future HOV facilities on I-270. The optimization of two lanes (one in each direction) on Midcounty Highway, however, provides minimal speed benefit to HOV users and unduly penalizes SOVs. The speed of the SOVs dropped from 35 mph to 23 mph after the HOV conversion (Table 18). HOV speed increased by only three mph. In addition, the low demand for the HOV lane indicates that the alignment is not warranted.

- **US 29 (Alignment A)**

The alignment is another included in the Issues Report. Despite a substantial increase in person volume, the US 29 alignment is not recommended for further study as a long-haul HOV facility for three reasons:

- HOV accessibility increases are minimal.
- US 29 along its entire route parallels the limited-access freeway I-95, on which an HOV facility is under consideration by MDOT in its statewide HOV network. HOV lanes would be more appropriate on I-95 as it provides a direct high-speed connection between the proposed HOV lanes on both the Capital Beltway and the Baltimore Beltway.
- The transit potential for this alignment is very strong and one that cannot be met by alternative alignments.

Another portion of US 29, from the Beltway to the Silver Spring CBD, was also evaluated for use as a spur HOV facility (see below). Furthermore, the entire alignment was also considered for its potential as a shared HOV facility.

B. Spur HOV Alignments

One way to boost the effectiveness of the regional HOV network is to ensure that carpools can directly access activity centers more quickly than SOVs. Since most activity centers in Montgomery County are not adjacent to long-haul HOV facilities, direct carpool access to an activity center can be facilitated by a short HOV lane on an arterial roadway. This is called a spur HOV lane.

Seven spur HOV lanes were tested in this analysis. Six of them branched from the Capital Beltway to one of three CBDs: Bethesda, Wheaton, or Silver Spring. The remaining spur HOV facility would move traffic from North Bethesda to near I-270 via the Montrose Parkway.

Recommendations

Based on the results listed in Table 19, two spur HOV alignments are proposed for further study by other agencies:

- **Wisconsin Avenue (MD 355) from Cedar Lane to Woodmont Avenue,**
- **Colesville Road (US 29) from the Capital Beltway to Spring Street.**

Both of these recommendations are entirely contingent on the status of HOV lanes on the Beltway. If the ongoing Beltway HOV study determines that HOV lanes on the Beltway would be feasible and sufficiently utilized, SHA and MCDOT should study the possibility of linking the Silver Spring CBD and Bethesda CBD to the Beltway via spur HOV lanes, including those links as part of the Beltway study.

The following five spur HOV lanes listed in Table 19 are not recommended for further study:

- **Montrose Parkway to North Bethesda**

The 1992 North Bethesda-Garrett Park Master Plan proposed potential HOV use of a section of the recommended Montrose Parkway. The Parkway would extend from Veirs Mill Road to Montrose Road just east of Tildenwood Drive; the HOV lane would be limited to the section from Veirs Mill Road to Parklawn Drive. The study done in this Alternatives Report converted one of the two lanes in each direction to HOV use; demand analysis found that few HOVs would use the alignment. More HOVs might use the Parkway if it connected directly to I-270, particularly via an HOV-only ramp. However, the I-270 connection does not appear to be feasible due to the presence of extensive wetlands east of I-270.

Table 19
Spur HOV Evaluation Results

Facility		Without HOV			With HOV						
		Peak General Use	Off-peak General Use	P E R S O N	V O L U M E	Peak General Use	Peak HOV	Off-peak General Use	Off-Peak HOV	P E R S O N	V O L U M E
Bethesda CBD											
Wisconsin Avenue: Woodmont Avenue to Cedar Lane	Vehicles (lane/hour)	625	625			775	1000	625	::		
	Lanes	3	3	4125		3	1	3	::		6450
	Speed (mph)	25	25			21	25	25	::		
Silver Spring CBD											
Georgia Avenue: Spring Street to I-495	Vehicles (lane/hour)	950	1075			975	1000	600	::		
	Lanes	4	3	7725		3	1	3	::		6950
	Speed (mph)	15	12			15	14	26			
Colesville Road: Spring Street to I-495	Vehicles (lane/hour)	475	425			575	850	500	::		
	Lanes	4	2	2700		3	1	2	::		4650
	Speed (mph)	29	25			26	17	29	::		
Wheaton CBD											
Connecticut Avenue/ University Blvd: Georgia Ave. to I-495	Vehicles (lane/hour)	700	200			675	325	200	::		
	Lanes	3	3	3025		2	1	3			2650
	Speed (mph)	23	31			24	35	37	::		
Georgia Avenue: Veirs Mill Road to I-495	Vehicles (lane/hour)	625	550			850	375	575	::		
	Lanes	3	3	3825		2	1	3			4300
	Speed (mph)	25	29			17	33	27	::		
University Boulevard: Georgia Avenue to I-495	Vehicles (lane/hour)	400	525			600	300	525	::		
	Lanes	3	3	3100		2	1	3			3425
	Speed (mph)	33	29			27	35	29	::		
North Bethesda											
Montrose Parkway: Parklawn Drive to Tildenwood Lane (Peak flow is westbound)	Vehicles (lane/hour)	1250	1250			1550	575	1500	500		
	Lanes	2	2	5525		1	1	1	1		5450
	Speed (mph)	53	53			42	64	44	64		

"Peak" and "Off-peak" refer to the direction of the traffic flow.
:: indicates the lack of a directional lane.

Section 3

- **Georgia Avenue to the Silver Spring CBD**

While the Georgia Avenue alignment attracted a number of HOVs, the total number of people moved by Georgia Avenue in the peak hour diminished.

- **Connecticut Avenue/University Boulevard to the Wheaton CBD**
- **Georgia Avenue to the Wheaton CBD**
- **University Boulevard to the Wheaton CBD**

None of the set of spur HOV alignments to Wheaton attracted much demand; neither did they increase the person volume of the roads significantly enough to justify converting a lane to HOV use. One characteristic of the Wheaton CBD that may account for the lack of demand is the less dense employment development as compared to both the Bethesda and Silver Spring CBDs.

C. Shared HOV Alignments

The possibility for shared bus/carpool use of an HOV lane was also considered. Such a use currently exists and is quite successful on the Shirley Highway (I-395) in Northern Virginia. Two alignments — US 29 between Silver Spring and Burtonsville, and Georgia Avenue between Glenmont and Olney — were initially considered with this configuration.

However, considerations for safety precluded the testing of either. While the Shirley Highway HOV facility is two lanes, both the US 29 and Georgia Avenue alignments are only one lane. No one-lane HOV facility in the country allows both carpools and buses. While one-lane busways exist, the buses using them are operated by professional drivers. The potential safety problems are too difficult to overcome at this stage of planning, particularly with the volume of buses forecast for these two roadways.

4. Transitway and HOV Networks: Evaluation Results

A major strength of the Transitway and HOV Network Master Plan lies in its scope. By studying a County-wide network in its regional context rather than a single facility restricted by planning area boundaries, it is hoped that relationships between existing, master-planned, and potential facilities can be uncovered and utilized. This section presents the results of analyses on the networks formed by the Alternatives Report's proposed HOV and transitway alignments.

A. Transitway Network

In addition to the background transit facilities, the network of highest demand transit improvements (detailed individually in Section 2) includes:

- the Georgia Avenue alignment as a busway,
- the Grosvenor-White Oak alignment as a light rail line through-routed with the North Bethesda Transitway,
- the US 29 alignment as a light rail line through-routed with the Georgetown Branch Transitway,
- the Bethesda-Tysons Corner alignment as a light rail line through-routed with the Georgetown Branch Transitway,
- three alignments (Norbeck Road, Veirs Mill Road, and Glenmont-White Flint) with improvements to on-street bus service.

Different options regarding mode and through-routing were evaluated with each alignment in Section 2. The combination of options presented here was chosen to produce the highest County-wide benefit to transit use and transit accessibility.

Section 4

The performance of the network is shown in [Table 20](#) and [Table 21](#). Most notable is the increase in County-wide transitway miles (column 1) versus the increase in County-wide transit demand (column 2). An efficient and productive addition to the transit network increases demand by a greater percentage than it increases mileage to the network. The transit network tested here accomplishes this by increasing transit mileage only two percent while boosting transit demand over 10 percent. Average transit use across the County also supports the network's efficiency (column 3). Transit accessibility also increases by nearly 7.5 percent (column 4).

Table 20
Transitway Network Substantially Increases County-wide Transit Demand

1.	2.	3.	4.
Change in County-wide Transit Miles	Change in County-wide Transit Miles Traveled	Change in Average County-wide Transit Demand	Transit Accessibility Change
2%	11%	9%	6.0-7.5%

See [Appendix 4](#) for more information on these measures.

1. **Change in County-wide Transit Miles:** The transit line mileage change in Montgomery County with the addition of the recommended network.
2. **Change in County-wide Transit Miles Traveled:** The change in the number of miles traveled on all transit lines in Montgomery County with the addition of the recommended network.
3. **Change in Average County-wide Transit Demand:** The change in miles traveled per mile of transit in Montgomery County.
4. **Transit Accessibility Increase:** A measure indicating the additional jobs and housing units available by transit.

It is also important to evaluate the relationship of the transitway network of alignments to the transit network assumed to exist in the year 2010. [Table 21](#) shows the change in demand for each of six systems and facilities. The effect of the greatest magnitude is on the bus system (column 7). The explanation for this is similar to that noted in [Section 2](#): bus routes on US 29 constitutes nearly a quarter of the County-wide bus demand. Replacing these bus routes with a rail line enables resources to be transferred from bus operations to other transit operations.

Table 21
Effect of Transitway Network on Other Transit Facilities

5. Metrorail Red Line	6. MARC	7. Bus*	8. Georgetown Branch Transitway	9. North Bethesda Transitway	10. Corridor Cities Transitway
0-4%	0-4%	(8-12%)	20 + %	8-12%	4-8%

(-) indicates negative effect.

Measured in percent change of 2010 passenger miles traveled.

Evaluated during evening peak period (3:30 pm - 6:30 pm).

* Includes impact on both Metrobus and Ride-On service.

B. HOV Network

The network of most used HOV facilities includes:

- Clara Barton Parkway/Cabin John Parkway: one peak-direction lane converted from general use between the Beltway and Washington, D.C.,¹⁵
- Wisconsin Avenue (MD 355): one peak-direction lane added between Cedar Lane and Woodmont Avenue,
- Colesville Road (US 29): one peak-direction lane converted from general use between the Beltway and Spring Street.

The network of HOV lanes assumed to exist in the year 2010 includes:

- I-270: one peak-period HOV lane in each direction from the Beltway to MD 121,
- Beltway: one peak-period HOV lane in each direction from I-95 east to the American Legion Bridge, continuing to the Woodrow Wilson Bridge through Virginia,
- I-95: one peak-period HOV lane in each direction from the Capital Beltway to the Baltimore Beltway,
- ICC: one peak-period HOV lane in each direction along its entire master-planned length to US 1 in Prince George's County.

¹⁵ While two lanes are available along most of the Parkway, the National Park Service only operates a single lane in some sections.

Section 4

Table 22 presents data documenting the performance of the recommended HOV network. Noteworthy is the substantial improvement in County-wide accessibility (column 3). More jobs and homes are accessible in less time to carpools with the addition of the recommended HOV network.

Similar to the full transit network evaluation, figures showing the percent change of HOV lane miles added and the change in HOV miles traveled they produced is shown (columns 1 and 2). Efficient additions to the HOV network would add a greater percentage of carpools to the HOV network than the percentage of miles added to the HOV network. For instance, a new carpool could form in Gaithersburg and use the I-270 HOV lane, shift to the outer loop Beltway HOV lane and onto the Cabin John Parkway and Clara Barton Parkway into Georgetown. The time savings provided by the carpool may not have been sufficient for it to form without the final link into Georgetown. However, the two figures for the recommended HOV additions are equal. One reason for this is the classification of the two spur HOV facilities. The spur HOV lanes are on major highways, and fewer cars can travel on major highways than on freeways. Since fewer vehicles can travel on the spur HOV lanes, fewer miles are traveled on them as well, skewing the comparison between the two figures.

Table 22
Clara Barton/Cabin John and Spur HOV Alignments Help Carpools
County-wide

1.	2.	3.
Change in County-wide HOV Lane Miles	Change in County-wide HOV Miles Traveled	Change in County-wide HOV Accessibility
5%	5%	10.5-12%

See [Appendix C](#) for explanation of all measures.

1. **Change in County-wide HOV Lane Miles:** The percent change in the mileage of HOV lanes in Montgomery County with the addition of the recommended network.
2. **Change in County-wide HOV Miles Traveled:** The percent change in the total number of vehicle miles traveled on HOV lanes in Montgomery County.
3. **Change in County-wide HOV Accessibility:** A measure indicating the change in job and housing opportunities accessible by carpools within a certain amount of time.

The recommended HOV network had a negligible effect on existing and master-planned transit facilities. Transit and HOV facilities do compete, but most of the competition comes from longer high-capacity facilities such as I-270 and the Beltway.

C. Combined Transitway and HOV Network

Finally, the County-wide impact of the combined recommended transit network and recommended HOV network was evaluated. Results are shown in Table 23 and Table 24. The addition of the full HOV network to the full transitway network diminished average County-wide transit demand from nine percent to six percent (column 1). However, the accessibility provided by the transit network remained stable. The miles traveled on County-wide HOV facilities also remained stable with an increase of five percent.

Table 23
Transitway and HOV Networks Together Increase County-wide HOV Accessibility

1. Increase in Average County-wide Transit Demand	2. Increase in County-wide Transit Accessibility	3. Increase in County-wide Miles Traveled on HOV	4. Increase in County-wide HOV Accessibility
6%	6.0-7.5%	5%	10.5-12.0%

Table 24
Transitway and HOV Networks Boost Georgetown Branch and Metrorail

5. Metrorail Red Line	6. MARC	7. Bus*	8. Georgetown Branch Transitway	9. North Bethesda Transitway	10. Corridor Cities Transitway
0-4%	0-4%	(8-12%)	12-16%	0-4%	--

() indicates negative effect.

-- indicates negligible effect.

Measured in percent change of 2010 passenger miles traveled.

Evaluated during evening peak period (3:30 pm - 6:30 pm).

* Includes impact on both Metrobus and Ride-On service.



5.

Future Steps

What will happen to the alignments approved by the Planning Board for further study? There are several possibilities.

A. Transit Network

Although the Alternatives Report puts the transitway network into three categories, the Planning Department views transit service as integrated. The alignments recommended for further study by other agencies should receive as much attention as those to be studied by the Planning Department.

Further Transitway Study by the Planning Department

- **Georgia Avenue (Alignment E)**

The Staff Draft Master Plan will be based on the Issues Report, Alternatives Report, and detailed right-of-way delineation of the Georgia Avenue alignment. If approved and adopted, the right-of-way for the Georgia Avenue transitway will be placed on the Kensington-Wheaton, Aspen Hill, and Olney Master Plans.

Transitway Study by Other Agencies and Future Study by the Planning Department

- **US 29 (Alignment A)**

This alignment shows the strongest transit demand. But it is unlikely that the right-of-way for an at-grade rail transit connection to the Silver Spring Metro station can be acquired. Furthermore, the above-grade and below-grade options, which have minimal at-grade requirements, are impossible to study without knowing the mode of transportation. It is not productive to study the alignment further without a

Section 5

commitment to an in-depth evaluation of the options. Such an evaluation would be beyond the scope of this Master Plan.

MCDOT is conducting a consultant study of US 29 between Sligo Creek Parkway and Stewart Lane north of New Hampshire Avenue to determine the feasibility of an exclusive bus lane within the existing right-of-way. If the study concludes that such a busway is not feasible, the Planning Department, in coordination with MCDOT and MDOT, should consider alternative operational approaches to provide improved transit service between the Silver Spring Metro station and Burtonsville. However, without significant policy changes, no other major analysis is currently seen as worthwhile.

- **Bethesda-Tysons Corner (Alignment S)**

Strong demand for transit is forecast between the Bethesda Metro station and a station — possibly a Metrorail station — at Tysons Corner. The linkage would also benefit those in the Dulles Airport corridor that would be connected via the transit line proposed by Fairfax County. The demand should be evaluated in a regional context by the Washington Metropolitan Area Transit Authority (WMATA) or a state agency such as MDOT. Since the alignment might link two Metrorail stations, WMATA should consider the alignment as it develops its plans to expand the 103-mile Metrorail system. MDOT should also consider the regional link as part of their long-range network planning or as part of the review of options for transportation connections with Virginia.

- **Grosvenor-White Oak (Alignment R)**

Analysis showed substantial future demand for a transitway between Grosvenor and White Oak via Wheaton. While the primary east-west transit project is the Georgetown Branch Transitway, further relief can be provided by an alignment between the Beltway and the ICC. Analysis has tested a dozen east-west routes between the Beltway and the ICC and the results showed that the best location in terms of network connections and supportive development is between Grosvenor and White Oak via Wheaton.

However, the alignment is not recommended for further study at this time. The Grosvenor-White Oak alignment is conceived as an extension of the master-planned North Bethesda Transitway. It is therefore appropriate to study this alignment further when the North Bethesda Transitway has been constructed and operational experience is available to form the basis for more detailed planning.

Further Study for Operational Improvements by Other Agencies

- **Glenmont-White Flint (Alignment S)**
- **Veirs Mill Road (portion of Alignment B)**
- **Norbeck Road (portion of Alignment O)**

Each of these three alignments should be studied to determine the feasibility of operational improvements that would facilitate bus transit service. Some examples (Section 2.F) are:

- Signal pre-emption: Devices to allow buses to move through intersections more quickly.
- Queue jumpers: Extra lane at congested areas, such as intersections, only to be used by buses.
- Expanded or more frequent service: Change or add bus routes to cover more neighborhoods and increase the bus routes' frequency.

B. HOV Network

Long-haul HOV

The Alternatives Report recommends only one long-haul HOV facility for further study:

- **Clara Barton Parkway and Cabin John Parkway (Alignment Q)**

Because additional right-of-way is not needed to protect this alignment, it will not be studied further in this planning effort. The evaluation of this alignment, however, indicates high commuter demand and a substantial increase in County-wide accessibility. Therefore, the Planning Department recommends that the National Park Service and SHA seriously consider establishing the Clara Barton Parkway and Cabin John Parkway as HOV facilities in conjunction with HOV lanes on the West Spur of I-270. Furthermore, the ongoing Beltway MIS provides an opportunity to coordinate planning for potential HOV lanes both on the Beltway and on the Clara Barton Parkway/Cabin John Parkway alignment.

Spur HOV

Two spur HOV facilities are proposed for further study:

- **Wisconsin Avenue from Cedar Lane to Woodmont Avenue**
- **Colesville Road from the Beltway to Spring Street**

These spur HOV lanes should be studied by SHA and MCDOT, possibly in conjunction with the ongoing Beltway MIS as alternatives. If HOV lanes on the Beltway are not implemented, the spur HOV recommendations should not be implemented.

Shared HOV

No shared HOV facilities are recommended for further study by the Alternatives Report.

C. Sequence of Implementation

Not all of the previously master-planned transitways and HOV lanes and those proposed for further evaluation in this Alternatives Report can or should be built at the same time. Some could be built whenever the demand warrants and the funds are available. Others depend on the completion of other transitways and HOV lanes.

Transit

The Georgetown Branch Transitway has the highest priority for transitway construction. Based on demand estimates, the first alignments studied in the Alternatives Report that should be built are US 29 and Bethesda-Tysons Corner. The US 29 and the Bethesda-Tysons Corner alignments have the first and second largest demand forecasts of the alignments evaluated in this Report. But they would also have significant community and funding issues that need to be resolved. The completion of the Georgetown Branch would enhance the demand for the other two alignments.

The Corridor Cities Transitway and Georgia Avenue alignment could be built at any time. Neither of them depends on the construction of other facilities.

The next group includes the North Bethesda Transitway and Grosvenor-White Oak alignment. The North Bethesda Transitway would provide needed transit service between the west branch of the Metrorail Red Line, the residential areas near the Grosvenor Metro station, the employment opportunities in Rock Spring Park, and Montgomery Mall. It should be constructed soon. The Grosvenor-White Oak alignment should not be built until the North Bethesda Transitway is completed. The

Grosvenor-White Oak transitway could be constructed in two phases, the first extending transit service to Wheaton. The extension from Wheaton to White Oak would be most effective if it were built after transit service improvements along US 29.

The Glenmont-White Flint and Norbeck Road bus service improvements would support the use of the Georgia Avenue Transitway and they should be implemented prior to or concurrent with service on that transitway. The Veirs Mill Road bus transit improvements would enhance access to and from Wheaton, and they should be implemented prior to or concurrent with service on the Grosvenor-White Oak transitway, particularly between Wheaton and White Oak.

HOV

All HOV recommendations of the Alternatives Report depend in large part on HOV facilities on the Beltway and I-270. Sufficiently high demand on spur HOV lanes can only be achieved in conjunction with an HOV facility on the Beltway. Furthermore, HOV demand on the Clara Barton Parkway/Cabin John Parkway alignment is substantially augmented by HOV lanes on I-270 (including the west spur) and the Beltway. Therefore, the implementation of HOV facilities on both I-270 and the Beltway constitutes a crucial first step in this Master Plan's HOV network. Subsequent steps are largely independent, since each serves a different activity center.



A P P E N D I C E S

1 through 5



Appendix 1 Glossary of Terms

The terms defined here complement those in the Montgomery County Planning Department's Glossary of Planning Terms, available at the information counter.

Accessibility: A measure used in evaluating a transportation network's effectiveness. Generally, accessibility is based on the number of opportunities (homes or jobs) a person can reach within a certain amount of time. The more reached, the greater the accessibility. Accessibility can be measured for all modes or by specific mode: driving alone, taking transit, or riding in a high-occupancy vehicle (HOV). (See HOV Accessibility, SOV Accessibility, Transit Accessibility.)

Activity Center: Concentration of housing and/or jobs in a relatively small area.

Alignment: A road or stretch of land being evaluated for use as a transitway or HOV facility. At the Alternatives Report level of analysis, the description of an alignment does not include its exact location along its associated roadway or right-of-way.

Busway: A facility devoted entirely to buses; can be either dedicated bus lane(s) in a road's right-of-way or an entirely separate right-of-way.

Calibration: The adjustment of model parameters to reasonably reproduce, or simulate, observed values.

Destination Choice: See Trip Distribution.

Dwell Time: The amount of time a transit vehicle waits at a station.

Headway: A determinant of the frequency of service: a two-minute headway means a transit vehicle arrives at a station every two minutes.

Heavy Rail Transit: Urban transportation system noted for high speeds (up to 70 mph), the existence of a third rail, or the electrified rail from which the vehicles draw their power, and high people-moving capacity. Often underground and known as the subway. Pedestrians cannot cross the tracks except via an entirely separate facility such as an underpass or footbridge. A local example is the Metrorail system.

Appendix 1

High-Occupancy Vehicle (HOV): A motorized vehicle with two or more occupants. This can include cars, vans, and buses. An HOV facility is one that restricts usage to HOVs only. (See also Long-haul HOV, Shared HOV, Spur HOV.)

HOV Accessibility: Measure indicating the number of opportunities (jobs and houses) that can be reached by carpooling. Similar to SOV Accessibility except for a 10-minute penalty assessed for picking up each carpool passenger.

Intermodal: See Multimodal.

Junction: The intersection of two or more segments. Passengers transferring from one segment to another were assessed an insignificant transfer penalty. (From an early phase of Alternatives Report analysis.)

Light Rail Transit (LRT): An urban transportation system that uses electrically powered rail cars operating singly or in short trains on fixed guideways. It may be grade separated, and passengers can board from low to medium-height platforms. The speed is somewhat less than heavy rail transit, but because it does not use a potentially dangerous third rail for power, it can run on city streets and pedestrians can easily cross the tracks. A local example is the Baltimore Central Light Rail.

Long-haul HOV: Long distance HOV facility, it generally operates on freeways or limited access major highways and does not provide much land access.

MARC: The Maryland Rail Commuter service operated by MDOT operates three lines, two to Baltimore and points north (Camden and Penn) and one through Montgomery County to West Virginia (Brunswick). Commuter rail is normally used for longer journeys and connects the outer suburban areas to the urban districts. Stations are generally far apart and the trains travel up to 70 mph.

Metrorail: The Washington Metropolitan Area Transit Authority's rapid rail transit system, composed of the Red, Orange, Yellow, Green, and Blue lines.

Modal Split: The percent of trips making use of the various methods of transport, including transit, auto driver, auto passenger, walk, bike, or other. (same as modal choice)

Multimodal: Dealing with more than one mode of transportation (e.g., single-occupant auto, bus, rail transit, and walking/bicycling) or the connections between these modes. Often used interchangeably with intermodal. The Alternatives Report uses multimodal exclusively.

Network: For the purposes of the Alternatives Report, one or more alignments evaluated or analyzed together; in general, a set of transportation facilities (e.g., the present freeway network in Montgomery County would include the Capital Beltway, I-270, and I-370.

Network Data: Information that are input to a transportation model describing the highway network as a series of numbered links characterized by capacity, speed, length, and location.

Node: A focal point of activity.

Park-and-Ride Lots: Parking lots which allow all-day commuter parking to enable the auto driver to connect with carpools or transit.

Peak Hour Trips: Trips made in any transportation mode during the busiest times of the day, normally in the morning from 7:30 to 8:30 am and during the evening from 4:30 to 5:30 pm.

Queue Jumper: A right-of-way addition that allows certain vehicles (e.g., HOVs, or buses exclusively) to bypass a traffic bottleneck (such as a traffic signal or entrance ramp line) or toll. Examples include a system on the Bay Bridge in San Francisco that allows HOVs to bypass both the toll and the lines that form at the tollbooths.

Rideshare: A carpool or vanpool arrangement.

Segment: The length of an alignment between two junctions. (From an early phase of Alternatives Report analysis.)

Shared HOV: An HOV facility where buses, as well as automobiles satisfying the occupancy requirement, are allowed to travel.

SOV: Single-occupant vehicle; an automobile with only the driver as an occupant.

SOV Accessibility: Opportunities (jobs and homes) available by auto.

Spur HOV: A short HOV facility that connects an activity center to a long-haul or shared HOV facility.

Through-route: Elimination of a transfer between two transit lines. Equivalent to identical technologies being used on both lines.

Traffic zone: There are 296 geographically distinct areas in Montgomery County within the TRAVEL/2 model to detail the origins and destinations of trips. Such zones do not cross freeways such as the Capital Beltway or I-270 and generally contain within them homogenous socioeconomic groups.

Transit Accessibility: A measure indicating the number of opportunities (jobs and houses) that can be reached by transit. (See also Accessibility.)

Transit Serviceable: Locations of sufficient population, employment, and/or commercial density with adequate provision for pedestrian and bicycle access, organized in a manner that enables them to be served efficiently by public transit.

Transitway: Right-of-way designated for exclusive use by transit, including heavy or light rail vehicles and buses.

Trip Assignment: After trip generation, trip distribution and determination of mode shares (modal split) in the travel modeling process, the vehicle trips produced between zones are placed on roads in the modeling network. Trips are assigned to follow minimum time paths between zones, but these paths may change as roads in the network become congested, slowing traffic down.

Trip Distribution: The allocation of trips from a location among all the possible locations attracting those trips. The total trips arriving at or leaving a location (zone) after the distribution process must be as close as possible to the trips attracted to or produced by that zone in the trip generation process. (Also known as Destination Choice.)

Trip Generation: The number of one-way trips coming from or attracted to a location as a result of land use activity at the location.

Zone Data: Information input into a transportation model that describes the character of a given area by number of households, or amount of employment. This data is supplemented by parking costs, land area, access and egress times, and other relevant information.

Appendix 2 Planning Policy Background

The Transitway and HOV Network Master Plan reflects the objectives of planning and policy efforts not only in Montgomery County, but also at the regional, state, and federal levels. This appendix describes the relationships between the goals and objectives of other agencies and those of this Master Plan.

A. Regional Long Range Plan Development

Montgomery County is a member of the Metropolitan Washington Council of Governments (COG), a metropolitan planning organization. The Transportation Planning Board (TPB) of COG is responsible for transportation planning in the region. The TPB issues the long range plan (LRP) for the region that includes all the transportation-related projects to be built within a 20-year timeframe. While federal regulations require an update every three years to this LRP, the TPB may opt to update it more frequently. In the past, the LRP has been more of a “wish list” of transportation projects, one that did not take into consideration the financial, physical, or political constraints of constructing them.

This has changed recently. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) emphasizes the coordination between the metropolitan planning organization (MPO) such as COG and its associated state(s). One of these changes has been in the role of the LRP. ISTEA mandates that each MPO have a fiscally constrained LRP (CLRP), one that includes only those facilities for which there is a reasonable expectation of funding. The appropriate state department of transportation normally submits the projects for inclusion in the CLRP. The state must also consider the CLRP for each MPO within the state when devising its statewide LRP. However, the statewide LRP is not fiscally constrained.

Further, the conformity measures in the Clean Air Act Amendments of 1990 (CAA) ensure the set of construction projects included in the CLRP will not harm the region’s air quality. While this does not mean that everything in the CLRP will be constructed, it does mean that the transportation planning process can no longer operate independently of other planning concerns.

B. Relationship with Federal Policies

One of the most significant provisions of ISTEA, and the one that most affects the implementation of the recommendations of the Transitway and HOV Network Master Plan, is the potential for increased funding for transit construction, research, and planning. One of the reasons for this is the scheduled completion of the Interstate Highway Act of 1956 responsible for the nation's extensive interstate system. The completion of the original system and consideration of future additions to the National Highway System, combined with the CAA endorsements of alternate modes of travel, has turned Congress's eyes more toward transit's role in regional networks across the country.

The philosophical change this represents is expressed in ISTEA's list of factors that must be "considered, analyzed as appropriate, and reflected in the planning process..." by planners in all metropolitan areas. Final guidelines to this effect were jointly published last year by the Federal Highway Administration and the Federal Transit Administration. Relevant elements and factors are listed in Table 25.

Primary among the guidelines is the anticipation of future traffic patterns, which include "preservation of rights-of-way for construction of future transportation projects," as well as "using existing transportation facilities more efficiently." Stressing this anticipation is intended to force planners to think and plan beyond the next few years by also analyzing how the transportation network will function in 20 years as a result of a project or policy. Previously, most planning efforts focused on a corridor or smaller area. This Master Plan's large-scale scope parallels ISTEA's emphasis on macroscopic planning. Further evidence of ISTEA's recognition of transit is seen in its urging of planners to consider the "expansion, enhancement, and increased use of transit services."

In addition, Congress deliberately linked ISTEA and the CAAA by requiring planners to consider "the overall social, economic, energy, and environmental effects" of their plans. Previous transportation projects have been planned and constructed with only cursory recognition of their effects on other planning areas and non-transportation related concerns.

Table 25
Federal Goals Met by the Transitway and HOV Network Master Plan

***Factors and Elements that States and Metropolitan Planning Organizations Must Consider
in the Transportation Planning Process***

State	
(12)	Methods to reduce traffic congestion and to prevent traffic congestion from developing in areas where it does not yet occur, including methods which reduce motor vehicle travel, particularly single-occupant motor vehicle travel
(13)	Methods to expand and enhance appropriate transit services and to increase the use of such services (including commuter rail)
(17)	Preservation of rights-of-way for construction of future transportation projects, including identification of unused rights-of-way which may be needed for future transportation corridors, identification of those corridors for which action is most needed to prevent destruction or loss (including strategies for preventing loss of rights-of-way)
Metropolitan Planning Organization	
(1)	Preservation of existing transportation facilities and, where practical, ways to meet transportation needs by using existing transportation facilities more efficiently
(3)	The need to relieve congestion and prevent congestion from occurring where it does not yet occur including: The consideration of congestion management strategies or actions which improve the mobility of people and goods in all phases of the planning process
(10)	Preservation of rights-of-way for construction of future transportation projects, including future transportation corridors
(14)	Expansion, enhancement, and increased use of transit services

From: "Statewide Planning; Metropolitan Planning; Rule." Federal Register, vol. 58(207), October 28, 1993, 58066, 58072-3.

C. Relationship with State Policies

The Maryland Department of Transportation (MDOT) is in the process of establishing an ISTEA-mandated long range plan (LRP) through a series of public forums. In its LRP the state has also included a series of draft goals and objectives.

In its broad Travel Goal, MDOT explicitly stated that it would be desirable "to increase the efficiency and attractiveness of alternatives to the single occupant

vehicle.” In support of this goal, MDOT mentioned its intentions to provide an HOV network “supported by ample parking facilities,” to “provide rail or other exclusive right-of-way transit in corridors with high demand potential,” and, finally, to “manage travel demand by providing or supporting programs and services to encourage use of transit, vanpools, and carpools to reduce reliance on single occupancy vehicle travel.”

MDOT also provided a separate Intermodal Goal that emphasized the importance of “opportunities and access to transportation alternatives.” To achieve this goal, MDOT plans to “develop the integration of local, regional, and interstate transit systems.”

D. Relationship with Regional Policies

In its most recent constrained long range plan (CLRP), adopted in September 1994, the TPB included a series of policy goals and objectives. Some are beyond the scope of this Master Plan, particularly those dealing with pricing policies (e.g., parking cost increases) and land use changes (e.g., transit-oriented development). Nevertheless, the goals of the Transitway and HOV Network Master Plan goals correspond closely to those of the TPB. Relevant TPB goals are listed in Table 26.

The factors described above that ISTEA requires planners to consider provided the primary impetus for the TPB goals and objectives. As all of the ISTEA factors are reflected in the TPB goals and objectives, there is likely to be some repetition. However, the ISTEA factors are general since they must apply to all regions around the country. The TPB refined many of the factors to indicate the specific and varied transportation needs of the metropolitan Washington region. For instance, the ISTEA factor “Expansion, enhancement, and increased use of transit services” spawned several regional objectives, including C.3, C.4, F.1, and F.4 in Table 26.

The TPB goals and objectives also support this Alternatives Report’s emphasis on activity centers. This support is evidenced in objectives A.2 and F.4. Regional objectives stressing enhanced circumferential transportation are also incorporated in this Report.

Table 26

Transitway and HOV Network Master Plan Fulfills Many Regional Transportation Goals

A. *Transportation and Land Development*

Develop a transportation system which promotes economically and environmentally sustainable community patterns by concentrating development at centers along transportation corridors to conserve air, water, land, and energy resources. Use transportation planning strategies and measures that are supportive of regional and local land development policies to achieve this goal.

- A.2 Use transportation strategies to encourage local plans which promote concentrated development along existing transportation corridors and in close proximity to transportation centers.
- A.4 Consider the likely effect of transportation policy decisions on land use and development and the consistency of transportation plans and programs with the provision of all applicable short- and long-term land use and development plans.

B. *Transportation, the Environment, and Energy*

Develop and manage the transportation system to minimize adverse effects on human health, the environment, and energy consumption.

- B.2 Develop and manage the transportation system to meet the requirements of the Clean Air Act Amendments of 1990.
- B.4 Promote "clean" travel options by developing a greenway system that includes electric or other non-polluting high occupancy vehicles, bicycle, and pedestrian facilities.

C. *Congestion Management*

Manage the transportation system to mitigate traffic congestion through improvements that make the best use of the existing system by allowing traffic to flow better and through measures that encourage people to travel by means other than the single-occupant vehicle.

- C.3 Reduce transit travel time for buses and other high-occupancy vehicles through the use of exclusive lanes or priority treatment.
- C.4 Improve and expand regional ridesharing activities by promoting carpool, vanpool, and other high-occupancy vehicle programs, including providing preferential treatment for such vehicles.

F. *Transportation System*

Develop and fund an intermodal transportation system that meets the region's transportation goals and objectives, as well as supports the region's development, environmental, social, and economic goals.

- F.1 Expand and enhance transit services and the use of such services.
- F.4 Develop and implement a coordinated system of transit and high-occupancy vehicle facilities, connecting the region's activity centers, to accommodate both radial and circumferential travel.
- F.7 Encourage transportation system improvements based on how well they advance the overall development, transportation, and environmental goals for the region.
- F.10 Serve the region's transportation needs identified through the state intermodal facilities and systems management systems.
- F.11 Assess the effects of all transportation projects to be undertaken, without regard to whether such projects are publicly funded.
- F.13 Preserve rights-of-way for future transportation improvements, including identification of unused rights-of-way needed for future transportation corridors and identification of those corridors for which action is most needed to prevent destruction or loss.

BOLD indicates goals that this Master Plan directly fulfills.

From "Long-Range Transportation Plan for the National Capital Region." Metropolitan Washington Council of Governments, Transportation Planning Board, September 21, 1994, pp. 5-6 - 5-21.

E. Relationship with the General Plan

Locally, the provision of increased transit service and HOV priority lanes will help Montgomery County realize several important goals expressed in the recently adopted General Plan Refinement. In particular, it laid out eight transportation objectives and strategies for attaining them. Relevant objectives and strategies are listed in Table 27.

The 1993 General Plan Refinement's goals correspond with those of the other agencies. In particular, the idea of providing "a transit system... that is a viable alternative to single-occupant travel" is central to every transportation goal discussed here. In the discussion of the Transportation goals and objectives, the General Plan Refinement noted the "important conceptual change in [the Transportation] goal is the movement away from accommodating travel demand and towards managing travel demand and encouraging the availability of alternatives to the single-occupant vehicle." The reason for this change is that "the demand for single-occupant vehicle travel will usually outstrip the County's ability to meet it."

Geographically, the Transitway and HOV Network Master Plan supports the Refinement's concentration on the Urban Ring and I-270 Corridor. Furthermore, this Report emphasizes the necessity of improving east-west transit connections as the Refinement notes in one of its strategies.

Multimodalism means planning for the different needs of different modes without neglecting any. It also means ensuring that people can move from mode to another with relative ease. The Refinement reaffirms its previous accent on multimodalism: "As was recognized in the 1969 General Plan Update, it is vitally important that the emerging multimodal transportation network be well-connected and that transferring among the component parts be as convenient as possible."

Furthermore, the Transitway and HOV Network Master Plan supports the General Plan Refinement's reaffirmation of the wedges and corridors concept that has guided development and growth in Montgomery County for three decades. Such concentrations allow for more effective transit use than do the uncontrolled, spread-out developments characteristic of most post-World War II growth. In particular, the Refinement emphasizes activity centers in its County-wide growth strategy and the necessity of varied transportation modes to support these centers: "Relatively dense, compact centers are essential for Montgomery County's future. The major centers especially will conserve energy, reduce vehicle trips, and minimize the amount of land that experiences the impacts of development.... This vision cannot be realized without the infrastructure needed to support the density." (p. 15)

Table 27

Transitway and HOV Network Master Plan Helps Achieve Many Goals of the General Plan Refinement

TRANSPORTATION GOAL: Objectives and Strategies

Enhance mobility by providing a safe and efficient transportation system offering a wide range of alternatives that serve the environmental, economic, social, and land use needs of the County and provides a framework for development.

Objective 1 **Develop an interconnected transportation system that provides choices in the modes and routes of travel.**

Strategies

- A** **Identify and protect rights-of-way for the future transportation system.**
- B** **Give priority to improving east-west travel.**
- C** **Encourage regional, State, and federal agencies to implement transportation system improvements, including accessibility to other jurisdictions in a manner which is consistent with County goals.**

Objective 2 **Provide appropriate access to, around, and within communities by using a full range of travelways.**

Strategies

- B** **Establish network plans for all modes of transportation.**
- C** **Match land uses and intensities to appropriate travelways.**

Objective 4 **Provide a transit system in appropriate areas of the County that is a viable alternative to single-occupant vehicle travel.**

Strategies

- A** **Give priority to establishing exclusive travelways for transit and high-occupancy vehicles serving the Urban Ring and Corridor.**
- E** **Provide for station locations that minimize the number and/or duration of transfers.**
- G** **Make transit use more price- and time-competitive with auto use.**

Objective 7 **Prevent degradation to the overall quality of the air, land, and water in the provision and use of the transportation system.**

Strategies

- B** **Give priority to transportation projects and policies that promote efficient use of energy and attain clean air standards.**
- C** **Support land use decisions by encouraging alternatives to the internal combustion engine and the use of fossil fuels.**

From: Approved and Adopted General Plan Refinement. 1993. Montgomery County Planning Department, pp. 72-75.

Relationship with other Montgomery County Policies

The Transitway and HOV Network Master Plan builds on several other previous Montgomery County plans and policies, including:

- ...On Wedges and Corridors: A General Plan (1964)
- Updated General Plan (1969)
- The General Plan Assessment (1987)
- Envisioning Our Future (1988)
- Comprehensive Growth Policy Study (1989)
- I-270 Corridor Cities Transit Easement Study (1990)
- Action Agenda: Growth Management Advisory Work Group (1991)
- The Transportation Network Studies (1992)

See Appendix L for brief descriptions of the relevant findings and information presented in these publications.

F. Maryland Economic Development, Resource Protection, and Planning Act of 1992

Finally, and in a much broader sense, the objectives of the Transitway and HOV Network Master Plan will support the goals of the Maryland Economic Development, Resource Protection, and Planning Act of 1992. As stated in Article 66B, Section 3.06 of the Annotated Code of Maryland, these visions are listed in Table 28.

Table 28

Seven Visions of the State Resource Protection and Planning Act of 1992

- (1) Development is to be concentrated in suitable areas;**
 - (2) Sensitive areas are to be protected;**
 - (3) In rural areas, growth is to be directed to existing population centers and resource areas are to be protected;**
 - (4) Stewardship of the Chesapeake Bay and the land is to be considered a universal ethic;**
 - (5) Conservation of resources, including a reduction in resource consumption, is to be practiced;**
 - (6) To assure the achievement of paragraphs 1 through 5 above, economic growth is encouraged and regulatory mechanisms are to be streamlined;**
 - (7) Funding mechanisms are to be addressed to achieve these objectives.**
-



Appendix 3 Related Transit and HOV Planning Studies

This appendix describes several related facility planning studies or projects that are currently in various stages of development and highlights their relationship to this planning effort. The facilities affected by ongoing planning projects are shown on Map F.

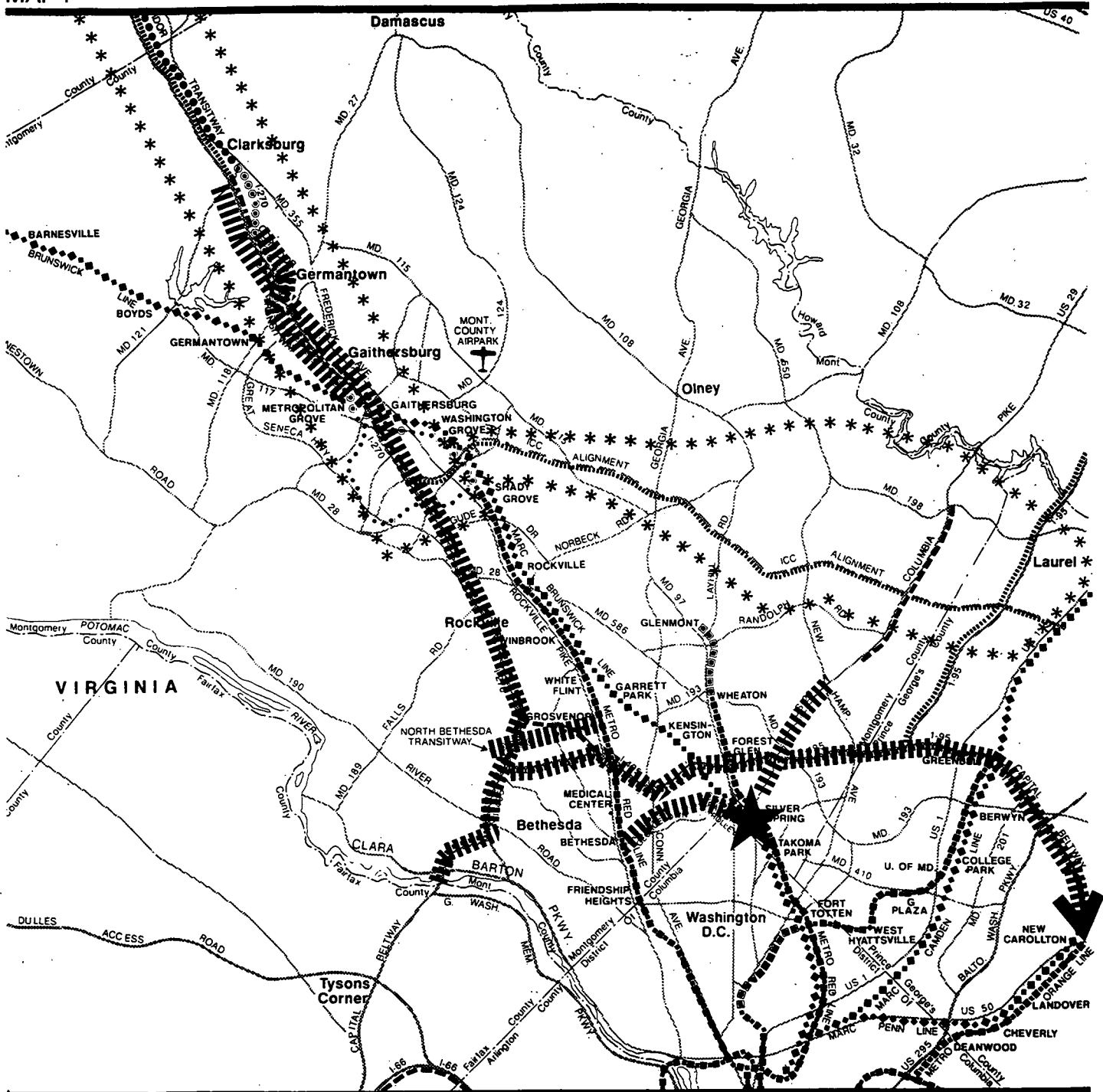
If constructed, the proposed alignments will support and be supported by facilities that exist today or are currently planned for 2010. Such transitways include existing Metrorail and MARC lines as well as the Georgetown Branch, Corridor Cities Transitway, and the North Bethesda Transitway. HOV facilities recommended for further study would be supported in Maryland by those on I-270, the Capital Beltway (I-495), and I-95. This mutual support should provide a stable base of users from which the recommended alignments can draw.

Some of these facilities still described here were included in the 2010 background transportation network, described in Appendix E. The background network is the set of transportation facilities that are assumed to exist in all the evaluations done for this Report.

A. Capital Beltway (I-495)

The Maryland State Highway Administration (SHA) is conducting a Major Investment Study (MIS) to determine the best approach to improve congestion on the Beltway. This MIS is being done in coordination with a similar study in Virginia. The different options being tested are: an HOV facility, a light rail line, congestion management strategies, and transportation demand management. The MIS is

MAP F



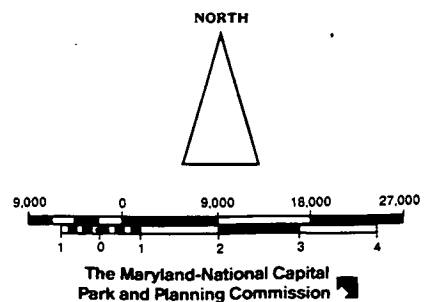
RELATED TRANSIT AND HOV PLANNING STUDIES

Transportation Planning Studies

- CORRIDOR STUDIES *****
- ALIGNMENT STUDIES |||||||||||||
- MULTI-MODAL FACILITIES ★

Background Facilities

- | | Existing | Planned |
|--------------------------------|----------|---------|
| METRORAIL | ===== | ===== |
| MARC AND VIRGINIA RAIL EXPRESS | ◆◆◆◆◆ | ◆◆◆◆◆ |
| TRANSITWAY | ●●●●● | ●●●●● |
| CSXT AND AMTRAK | +++++ | +++++ |
| HOV LANES | ----- | ----- |



TRANSITWAY AND HOV NETWORK MASTER PLAN

scheduled for completion by late 1996. An HOV facility on the Beltway in Maryland is not in the background transportation network, although it has been included from the American Legion Bridge to I-95 only in the evaluation of HOV alignments and networks.

B. Intercounty Connector (ICC)

The alignment of the Intercounty Connector (ICC) has been on Montgomery County master plans for over three decades, originally as a portion of the Outer Beltway. The ICC is master-planned as a four-to six-lane divided limited-access roadway from I-370 near Gaithersburg to MD 3 in Prince George's County, although the current study extends only to US 1 in Prince George's County. As discussed in Appendix E, the ICC is in the background network of transportation facilities assumed in the modeling process for the year 2010.

Montgomery County is participating with federal and State agencies in re-evaluating the ICC through an Environmental Impact Statement (EIS). The ICC is currently in the "Purpose and Need" phase of the project that will study and characterize the need for east-west transportation enhancements. This will lead to the investigation, evaluation, and public review of alternatives, and finally to the designation of a preferred alternative and mode(s) of travel. The ICC EIS is slated for completion in 1996.

C. US 29

US 29 has been the subject of several different studies over the past decade. SHA initiated one in the early 1980s and recommended grade-separated interchanges at all intersections north from New Hampshire Avenue (MD 650) to the Montgomery County line. That study also recommended further analysis of transit options on US 29.

The Montgomery County Department of Transportation (MCDOT) is directing a consultant study to determine the feasibility of an exclusive bus lane within the existing right-of-way of US 29 between New Hampshire Avenue (MD 650) and Sligo Creek Parkway.

D. I-270 HOV Lanes

An HOV facility on I-270 from the Capital Beltway (I-495) north to MD 121 in Clarksburg has been planned and funds either allocated or identified for all of its construction. The project is scheduled for completion in four phases. Phase I, the northbound East Spur HOV lane, opened in September 1993, and Phase II, the

southbound East Spur HOV lane, opened in July 1994. Phase III, a northbound HOV lane from the Y-split north to MD 121 and a southbound HOV lane from MD 121 to I-370, is scheduled to open in the summer of 1996. The remaining section, Phase IV, a southbound lane from I-370 to the Y-split as well as an HOV lane in both directions of the West Spur, should open a year later in 1997.

The entire facility is currently slated to have an occupancy restriction of HOV 2+, although this could change to HOV 3+ if warranted by traffic demand. This facility is in the background transportation network as HOV 2+.

E. I-270 Multimodal Study

SHA and the Maryland Mass Transit Administration (MTA) are jointly conducting a multimodal study along I-270 from Shady Grove Road north to US 15 in Frederick County. It was initiated in 1992 in response to the Statewide Commuter Assistance Study (SCAS). The ongoing study is evaluating several alternatives, including:

- A light rail line on the Corridor Cities Transitway alignment (see below) accompanied by supporting parking lots,
- A busway on the transit alignment along with appropriate park-and-ride lots,
- HOV in the mainline I-270, not utilizing the transit alignment. This option is testing both HOV 3+ and HOV 2+ requirements,
- Transportation System Management (TSM)/Transportation Demand Management (TDM)¹⁶ alternative in which no major improvements are made in the corridor beyond those already programmed,
- A “no-build” option consisting solely of previously programmed improvements,
- Widening I-270 to eight lanes from MD 121 to I-70 and US 15 to six lanes from I-70 to MD 26.

The study has evolved into a feasibility study that will lead to an MIS by SHA/MTA. The intent of an MIS is to determine the mode and alignment of transportation improvements in the corridor and funding for those improvements.

¹⁶ TSM is the application of construction, operational, and institutional actions to make the most productive and cost-effective use of existing transportation facilities and services, including land use policy changes. TDM is the set of actions taken to reduce the number of peak-hour trips.

F. Corridor Cities Transitway

The Corridor Cities Transitway reaches from the Shady Grove Metro station to Clarksburg north of MD 121, roughly paralleling I-270. Supporting the County's "Wedges and Corridors" plan of development (see Appendix 2 and Appendix L), master plans have endorsed this transitway in concept for 20 years.

At this time, the mode (bus or light rail) for this transitway is being studied. If the I-270 Multimodal Study (see above) selects an alternative using the transitway, it will also recommend the mode to be used. Work is currently underway by the Montgomery County Planning Department to amend portions of the alignment on the affected master plans in response to the recommendations of a detailed alignment study conducted for the MCDOT between the Shady Grove Metrorail station and the Metropolitan Grove MARC station. A comparable study for the alignment north through Germantown to Clarksburg is anticipated to be completed in 1996. The ongoing Master Plan Amendment will also add the portion of the alignment along Quince Orchard Boulevard (MD 124) to the Gaithersburg Vicinity Master Plan.

The City of Gaithersburg is amending its master plan for Neighborhood Five (which includes the Metropolitan Grove MARC station) and its transportation elements. Approval of these master plans will add the alignments of the Corridor Cities Transitway to the City's Master Plan. This facility is in the background transportation network as light rail in the light rail network evaluations and as a busway in the busway network evaluations.

G. North Bethesda Transitway

This master-planned transitway is recommended to provide a high-speed elevated people mover between two major transit hubs, serving a two-million-square-foot retail center, a prominent corporate employment park, and dense suburban residential development. These activity centers are all along a 2.5-mile corridor but are separated by the two spurs of I-270.

A 1990 planning study concluded that a demonstrable transportation need existed in connecting these major activity centers — Montgomery Mall, Rock Spring Park, and Grosvenor Metro station — and recommended that further planning concentrate on an elevated fixed-guideway transit system. In 1992, the Federal Transit Administration selected this project as one of three finalists in the Suspended Light Rail System Technology Pilot Project Competition. However, since the competition appears that it will never reach its conclusion, the Montgomery County Department of Transportation (MCDOT) is exploring the application of all types of fixed-guideway systems and alternative financing and funding mechanisms for this project.

If federal funds are used, an Environmental Impact Study would be required before the project is approved and construction could begin. Additional information, including a more precise alignment, can be obtained from the Montgomery County Department of Transportation (MCDOT). The North Bethesda Transitway is recommended by the North Bethesda/Garrett Park Master Plan (1992) and is included in the background 2010 transportation network.

H. Georgetown Branch Transitway

The 1990 Georgetown Branch Master Plan Amendment proposes to use an abandoned railroad right-of-way, tracks intact, for a 4.4-mile light rail line with five stations. The eastern terminus is planned for the Silver Spring Metro station while the western end is planned to be near the Bethesda Metro station (see below for explanation). The Georgetown Branch would thus connect the two legs of the Metro Red line as well as two major employment, retail, population, and transit centers in Montgomery County. This facility is currently in the background transportation network. Information on the exact alignment, station locations, and right-of-way cross sections can be found in the Georgetown Branch Master Plan Amendment, approved and adopted in 1990.

Within the context of the Bethesda CBD Sector Plan in 1994, the County Council approved further study of two options for the Bethesda terminal station:

- (1) West of Apex Building: The terminus would require the construction of the southern entrance to the Bethesda Metro station and would place the terminal station west of the Apex Building at Elm Street.
- (2) North of Apex Building: Same as above but with a terminal access located north of the Apex Building at Elm Street and Wisconsin Avenue.

This alignment is currently the subject of a Major Investment Study/Draft Environmental Impact Study (MIS/DEIS) headed by MTA. The MIS will review the alternatives and weigh the impacts for constructing and operating public transit in the existing Georgetown Branch right-of-way. Furthermore, it will determine the mode of transit. Modal alternatives include a light rail line and various bus options. The MIS is also testing a "no-build" option along with TSM and TDM policies. Five stations, including the Bethesda and Silver Spring ends, are included for testing.

I. Silver Spring Multimodal Transit Center

A station that would provide easy access between several modes of transit adjacent to the present location of the Metro station is currently being studied by MTA. This multimodal center would incorporate Metrorail, MARC commuter rail (relocating the station one-half mile north from its present location), the master-planned eastern terminus for the Georgetown Branch light rail, a Metrobus and Ride-On bus hub, and a central location for intercity (Greyhound), MTA, Eyre commuter, and airport shuttle buses. Federal funds have already been appropriated for design and engineering for the project, and current plans project the station opening in 1997.

This proposal is strongly supported by the 1993 Silver Spring CBD Sector Plan: "This relocation should be undertaken as it is certainly in keeping with the Sector plan and Transportation Management District emphasis on encouraging non-auto access to and from the area." (p. 208)

When referring to this location in the text of the Alternatives Report, "Silver Spring Metro station" has been used as it is a more familiar term.



Appendix 4 Transitway Analysis Background

This appendix presents background information that may be helpful in understanding the evaluations of the four transitway alignments (Section 2). The information is presented in three parts:¹⁷

- A. **Process:** How were the 17 alignments evaluated as transitways?
- B. **Measures:** What yardsticks were used to evaluate the alignments?
- C. **Alternatives:** What alternatives were evaluated and how were they devised?

A. Transitway Evaluation Process

One of the earliest problems in the evaluation process was the extremely large number of possible networks that could be created by combinations of the 17 alignments and their component sections. To evaluate each of these networks separately would have required an unacceptable amount of staff and computer time.¹⁸ For that reason, the analysis was divided into several phases to successively eliminate alignments while ensuring a thorough examination of County-wide travel patterns.

Segments and Junctions

The first phase, "Segments and Junctions," was developed by the staff to discern County-wide patterns of transit demand. It mapped all of the alignments and the possible connections among them. The intersection of two or more alignments was termed a junction and the portion of an alignment between two junctions a

¹⁷ Appendix A also deals with the computer transportation model and Appendix B deals with the transitway evaluation process.

¹⁸ From a pool of 17 alignments, nearly 5000 unique networks can be formed. With a generous assumption of two hours of analysis per unique network, 1250 eight-hour days of nonstop work would be required to analyze them all.

segment. The network used to test the alignments at this stage in the analysis comprised:

- existing and already master-planned transit facilities,
- the 64 segments that formed more than 300 miles of potential transit service in Montgomery County and adjoining jurisdictions.

The combination represented a vast County-wide transit network on which residents and workers could travel. To ensure no segment had an operational advantage over another, every segment was assigned vehicles with the same speed and headway which were given an unlimited capacity. (The Segments and Junctions analysis is charted in Figure 7.)

A key characteristic of the relationship among alignments in the segments and junctions analysis was the elimination of the time period normally required to transfer from one segment to another. A transfer between two systems or modes is a time-consuming task that diminishes demand. With the transfer times eliminated, the computer let workers and residents travel by transit to any developed area of the County. Time penalties, however, were maintained for transfers to and among existing and master-planned transit services.

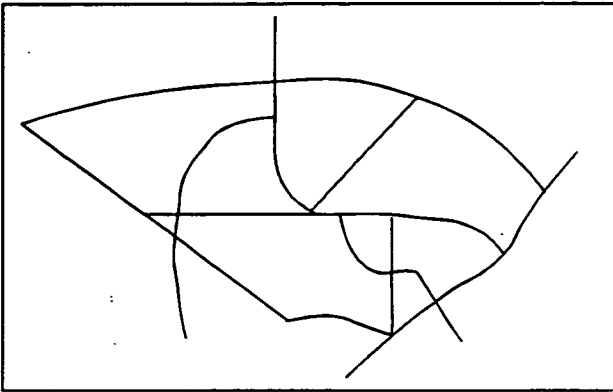
The alignments with segments that showed high demand were retained. The threshold for retention was set notably low in recognition that future evaluations would take into account factors that would increase relative transit demand. Segments with insufficient demand that competed were compared; the one that performed the best was kept if the removal of its competitors bumped it above the threshold. Forty-nine segments were eliminated. The 15 segments that were retained formed seven alignments.

Seven Routes

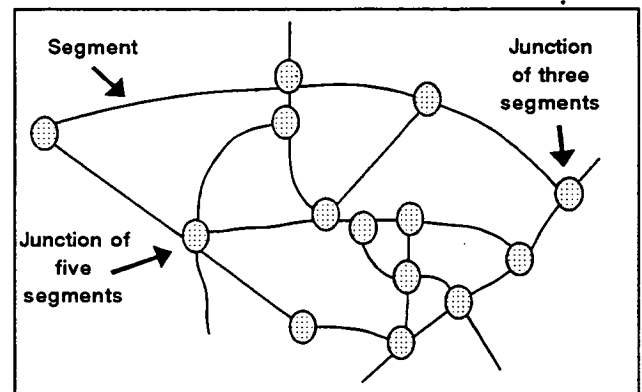
The seven alignments were next evaluated in the "Seven Routes" phase. Additional analyses were conducted using the segments and junctions approach, including through-routing (the elimination of a transfer between two transitways) to already master-planned transit lines. These analyses provided additional information regarding the relative demand of the alignments. Furthermore, this stage was the first to use transit accessibility as an evaluation criterion. Following these analyses, four of the seven alignments were subjected to a more detailed and mode specific phase of the evaluation.

Segments and Junctions

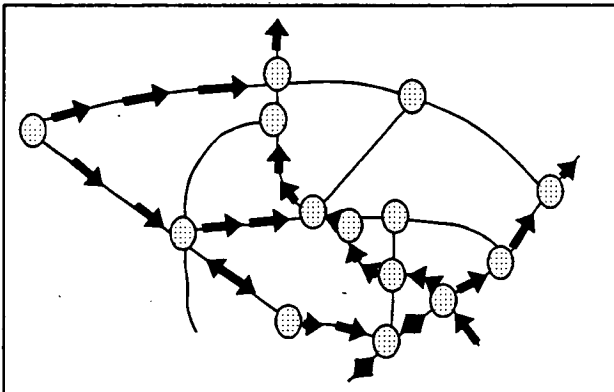
Step 1 Map the Network



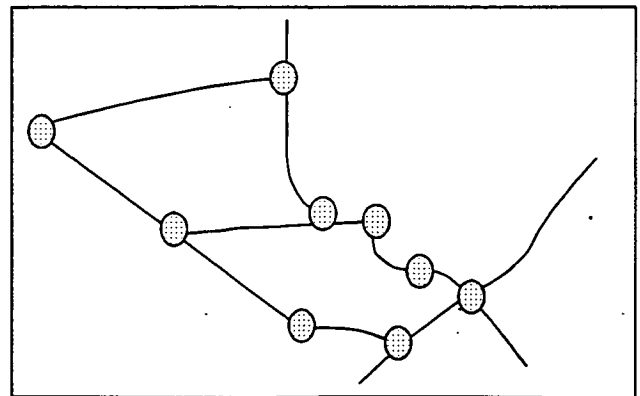
Step 2 Create Segments and Junctions



Step 3 Find predominant patterns of demand



Step 4 Eliminate segments not attracting sufficient demand



Mode Specific Routes

“Mode Specific Routes” looked at the demand on and effect of four alignments as a busway and as a light rail line. This phase determined that the number of stations along the route can have a significant effect on demand, and that an alignment’s demand will differ depending on the mode being modeled. Mode specific results are presented in Section 2.

B. Transitway Evaluation Measurements

The two primary measures used to evaluate transitway alignments were:

- transit accessibility
- transitway demand.

Two other measures were also used:

- impact on existing transit
- travel time savings.

Transit Accessibility

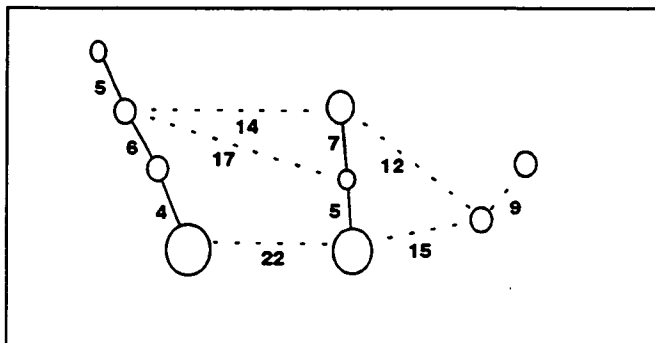
Transit accessibility stems directly from the Master Plan’s goal to improve County-wide mobility and deals with opportunities available by transit. The transportation model calculates the ease in reaching potential destinations by transit and then factors in the number of people who can use transit. A transit link providing improved service between two or more activity centers will increase accessibility more than a transit link between two areas of lesser density. Higher transit accessibility means more homes and jobs can be reached by transit. The County Council has passed legislation that incorporates this methodology into the calculations for the Annual Growth Policy. (An explanation of transit accessibility is charted in Figure 8.)

Nearly every developed area of the County is accessible by transit service — with rail links (Metrorail and MARC), bus service (Metrobus and Ride-On), as well as sidewalks for transit access. New facilities will logically be planned for:

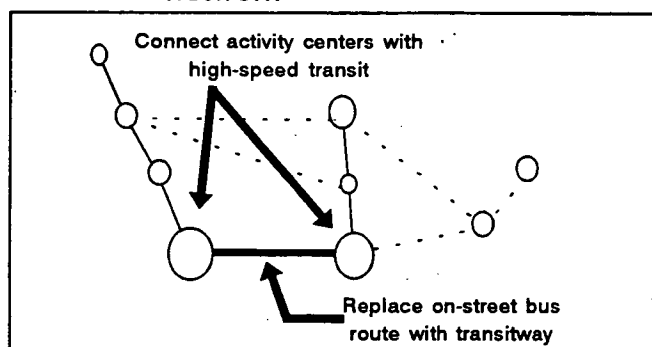
- Areas exhibiting intense bus transit usage, now and in the future (examples: US 29, Georgia Avenue),
- Areas with little transit service but with the development necessary to support it, generally in the form of circumferential routes between activity centers (examples: Bethesda-Tysons Corner, Grosvenor-White Oak).

Transit Accessibility

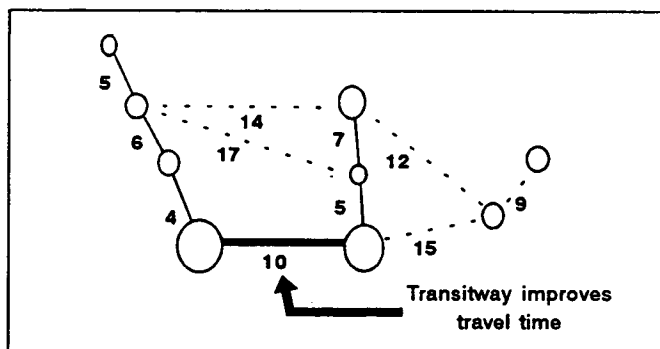
Step 1 Calculate base transit network travel times



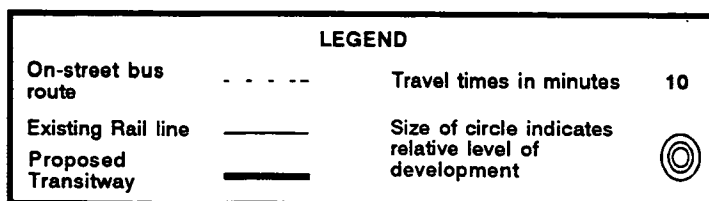
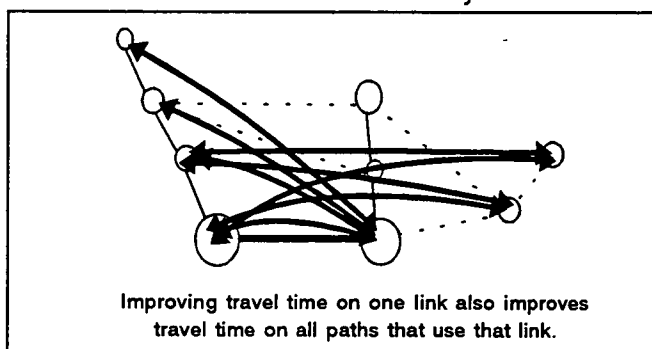
Step 2 Change one piece of the network



Step 3 Recalculate travel times for new network



Step 4 Calculate effect of change on network-wide mobility



Facilities planned to improve existing service rather than create new service will produce only a marginal increase in accessibility because existing coverage is so extensive and because County-wide patterns of development are not expected to change significantly during the next 20 years. While the potential for circumferential connections between activity centers is limited, the possibility of modifying travel patterns to remove work trips from the roadway network is encouraging.

Dramatic improvement in County-wide transit accessibility can be achieved only by a dramatic restructuring of the County-wide transit network. The recommendations of this report complement rather than replace existing and planned rail transit facilities, forming a County-wide network that enables more people to travel to more destinations in less time. The accessibility increases created by the transitways recommended in this Report, while seemingly small percentages, represent a significant amount of the available transit accessibility not already provided by services available in 2010, given transit coverage, the pattern of development, and current pricing policies.

Transitway Demand

Transitway demand measures the anticipated use of transit facilities. At this stage, the measure cannot be used as an interpretation of ridership. Ridership estimates require far more detailed information than is appropriate for this study. The information types are detailed in Appendix B.

Transportation models generally use three factors to calculate demand:

- Land use: The denser the employment or residential development, the more trips originating from or traveling there,
- Travel time: The longer it takes to make a trip, the less likely the trip will be taken,
- Travel cost: The more expensive a trip, the more likely a less expensive mode will be sought out.

The interaction among the three factors — as well as the data sources used to estimate their relationship — is explained more in Appendix A and in “TRAVEL/2: A Simultaneous Approach to Transportation Modeling,” available at the Montgomery County Planning Department.

There are several different ways to measure demand. Most often used are:

- Peak: The most-used segments of a transitway are compared,
- Total: A measurement (passenger miles of travel (PMT) or boardings and alightings) is summed up for the whole transitway,
- Average: A measurement is averaged along the whole transitway.

Peak demand may be appropriate for a comparison between segments of alignments, but it can be misleading if the demand falls off significantly in the other

parts of the alignment. Total demand, while more accurate than peak demand because it considers the entire length of an alignment, is not a measurement appropriate to compare alignments of different lengths.

This report used a measurement of average demand, expressed in passenger miles of travel per mile of transitway. Passenger miles traveled (PMT) measures the number of miles traveled on the transitway by all the passengers. (Ten passengers traveling four miles each is equivalent to two passengers traveling 20 miles each.) Dividing PMT by the length of the transitways results in a number that can be easily compared. Implicit in the measurement is the assumption that longer alignments should serve more passengers to justify their greater cost.

Impact on Existing Transit

The network effects were also evaluated to assess the County-wide role that each alignment plays. The network includes Metro and MARC rail service, Metro and Ride-On bus routes, and the three already master-planned transitways: Georgetown Branch, Corridor Cities, and North Bethesda Transitways.

The impact is measured as a percentage change of PMT on each service within the County, with Metrobus and Ride-On counting as a single bus service.

Travel Time Saved

Travel time differences are an important part of measuring a transitway since travel time is such a crucial factor in the decision to take one mode over another. Two separate measures of travel time differences are used in this Report. Both reflect travel time by a transportation mode from one end of the alignment to the other; both also use the travel time in the peak direction. The first, transitway vs. auto, shows the difference in travel time for users of the transitway and those driving in an automobile. The second, transitway vs. bus transit, shows the difference in travel time for those using the transitway and those riding on-street buses.

The travel time difference does not take into consideration the time required to access the various modes. For example, neither walking to the transitway stop nor walking from a job to a garage is calculated in travel time.

C. Alignment Alternatives

Georgia Avenue (Alignment E)

There were no alternatives evaluated for the Georgia Avenue Alignment.

Appendix 4

Grosvenor-White Oak (Alignment R)

Due to the alignment's potential community and environmental impact, a number of east-west transitway alternatives were evaluated. Each of these alternatives is defined by a site on each of three lines: one western, one middle, and one eastern. The three lines correspond to three roadways (west to east): MD 355, Georgia Avenue, and US 29. (The first two are also the west and east legs of the Metrorail Red Line.) Several alternative sites were chosen along each of these lines. A site was selected for two reasons: transit connectivity, and proximity to residential or commercial development. (The list of sites along with their rationale for their inclusion is in Table 29.)

Table 29
Alternative Sites for East-West Transit Connection

Name	Reason
Sites along Rockville Pike (MD 355) (west line)	
Grosvenor Metro station	<ul style="list-style-type: none">• Metro station• Dense residential development
White Flint Metro station	<ul style="list-style-type: none">• Metro station• Nearby housing and employment
Twinbrook Metro station	<ul style="list-style-type: none">• Metro station• Nearby employment
Sites along Georgia Avenue (MD 97) (mid line)	
Wheaton Metro station	<ul style="list-style-type: none">• Metro station• Nearby jobs, housing, and retail development in CBD
Glenmont Metro station	<ul style="list-style-type: none">• Future Metro station, possible endpoint for proposed Glenmont-Olney busway
Sites along US 29 (east line)	
Four Corners	<ul style="list-style-type: none">• Possible transit center• Retail development
White Oak	<ul style="list-style-type: none">• Nearby dense residential development and federal employment• Shopping center
East Randolph Road	<ul style="list-style-type: none">• Nearby townhouse development

A transitway connecting the three lines is almost evenly split in two, making the creation of alternatives a straightforward matter of using one western leg and one eastern leg as long as they have a common site along Georgia Avenue. Of the ten alternative legs evaluated, only two — White Flint to Wheaton and Grosvenor to Glenmont — were not also evaluated in an earlier phase of analysis. (The ten alternative alignments are listed in Table 30 and a conceptual map of the legs forming these alternative alignments is shown on Figure 9.)

Table 30
Alternatives for East-West Transitway Connection

#	West leg*	East leg*	App. Length (miles)
1	White Flint-Glenmont (W1)	Glenmont-US 29 (via Randolph Road) (E1)	9.25
2	Grosvenor-Glenmont (W2)	Glenmont-US 29 (via Randolph Road) (E1)	10.25
3	White Flint-Glenmont (W1)	Glenmont-White Oak (via Randolph/NH) (E2)	8.25
4	Grosvenor-Glenmont (W2)	Glenmont-White Oak (via Randolph/NH) (E2)	9.25
5	White Flint-Glenmont (W1)	Glenmont-White Oak (via Randolph Bypass) (E3)	7.00
6	Grosvenor-Glenmont (W2)	Glenmont-White Oak (via Randolph Bypass) (E3)	8.00
7	White Flint-Wheaton (W3)	Wheaton-White Oak (E4)	6.75
8	<i>Grosvenor-Wheaton (W4)</i>	<i>Wheaton-White Oak (E4)</i>	<i>6.50</i>
9	White Flint-Wheaton (W3)	Wheaton-Four Corners-White Oak (E5)	8.00
10	Grosvenor-Wheaton (W4)	Wheaton-Four Corners-White Oak (E5)	7.75

Italics indicate recommended alternative

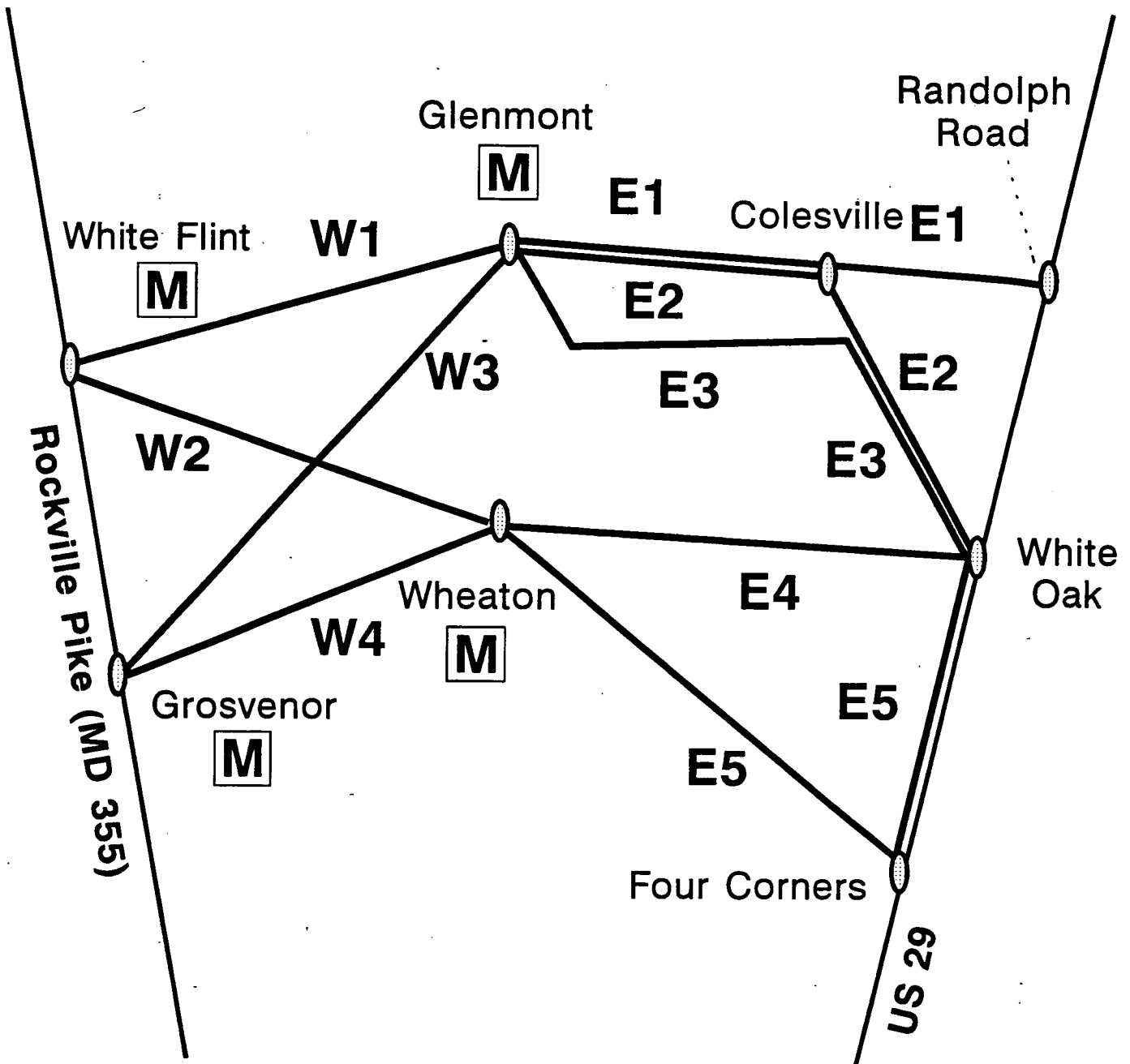
* Grosvenor, White Flint, Wheaton, and Glenmont indicate connections at each Metrorail station.

a. **Alternative Points**

The three western alternative sites — Grosvenor, Twinbrook, and White Flint — are different in their land uses and transportation connections. Grosvenor has over 3,000 existing housing units — mostly high-density buildings, garden apartments, and townhouses — but little commercial development. Twinbrook, on the other hand, has a mix of light industrial uses and federal agencies that provide for more than 9,000 jobs. But it has almost no residential development. White Flint has about 4,500 jobs and 300 housing units. Beginning with the FY 95 Annual Growth Policy (AGP), Montgomery County considered each area separately due to their importance as centers and to enhance their status as Metrorail station areas.

Figure 9

East-West Transitway Alternatives



In terms of transportation connections, the three are significantly different. Neither White Flint nor Twinbrook connects to an east-west transitway. Grosvenor has the potential to link with the North Bethesda Transitway, which would connect Grosvenor with the employment opportunities in Rock Spring Park and the retail activities in Montgomery Mall. An east-west transit connection with its western terminus at Grosvenor has greater potential for serving transit-supportive land uses than one terminating elsewhere.

The two middle site alternatives — Wheaton and Glenmont — are very different. Wheaton is one of the County's central business districts (CBD), with nearly 9,000 existing jobs and 2,000 existing housing units. Glenmont's current land use is much less dense than Wheaton's, and while the Glenmont Sector Plan is being revised, it is doubtful its zoning will be changed sufficiently to approach Wheaton's.

The three eastern alternative sites — Four Corners, White Oak, and East Randolph Road — are along US 29. Four Corners was not considered as an end site, but one along the path to White Oak. White Oak has the most nearby housing, retail, and employment development. Future consideration of the eastern end could also include a site at Montgomery Industrial Park.

b. Paths Between Points

If the transitway begins at Grosvenor, it can theoretically connect with either possibility at the midpoint at Georgia Avenue: the Glenmont Metro station or the Wheaton Metro station. While a connection from Grosvenor to Wheaton would not be simple, one from Grosvenor to Glenmont would be almost impossible. Such a line could traverse as much as 2.5 miles of established neighborhoods.

Once at Wheaton, the transitway can reach any of the four possibilities listed above along US 29. While the distance is shortest between Wheaton and White Oak, this in itself is not sufficient justification for choosing White Oak over the other three. If the community and/or environment were less disrupted by choosing another path, these factors would be taken into consideration in making a recommendation.

Since right-of-way exists at University Boulevard alongside Northwood High School, the path from Wheaton to US 29 might well use it no matter which location is used for the eastern terminus. From the western edge of Northwest Branch, it is approximately 1.2 miles straight-line distance to the White Oak Shopping Center; 2.3 miles to the Montgomery Industrial Park; 2.8 miles to East Randolph Road; and 3.6 miles to Fairland Road. Paths to all the sites along US 29 from the existing right-of-way west of Northwest Branch Park cross existing neighborhoods (including those surrounding White Oak) as well as another major stream valley at Paint Branch Park.

Table 31
Evaluation of Alternatives for East-West Transit Connection

	Transit Accessibility Increase*	2010 Transitway Demand**	Other transit demand***			
			Metrorail	MARC	North Bethesda Transitway	Georgetown Branch
1	White Flint-Glenmont-US 29 at Randolph Road					
	0-1.5%	875	--	--	0-4%	(0-4%)
2	Grosvenor-Glenmont-US 29 at Randolph Road					
	0-1.5%	925	--	--	4-8%	(0-4%)
3	White Flint-Glenmont-White Oak via Randolph Road/New Hampshire Avenue					
	0-1.5%	825	--	--	0-4%	(0-4%)
4	Grosvenor-Glenmont-White Oak via Randolph Road/New Hampshire Avenue					
	0-1.5%	900	--	--	4-8%	(0-4%)
5	White Flint-Glenmont-White Oak via Randolph Bypass/New Hampshire Avenue					
	0-1.5%	875	--	--	0-4%	(0-4%)
6	Grosvenor-Glenmont-White Oak via Randolph Bypass/New Hampshire Avenue					
	0-1.5%	825	--	--	4-8%	(0-4%)
7	White Flint-Wheaton-White Oak					
	0-1.5%	925	0-4%	(0-4%)	4-8%	0-4%
8	<i>Grosvenor-Wheaton-White Oak</i>					
	<i>0-1.5%</i>	<i>1350</i>	<i>0-4%</i>	--	<i>4-8%</i>	<i>(4-8%)</i>
9	White Flint-Wheaton-Four Corners-White Oak					
	0-1.5%	950	0-4%	(0-4%)	4-8%	0-4%
10	Grosvenor-Wheaton-Four Corners-White Oak					
	0-1.5%	875	0-4%	--	4-8%	(4-8%)

Italics indicate recommended alternative.

(-) indicates negative effect.

-- indicates negligible effect.

Evaluated during evening peak period (3:30 pm - 6:30 pm).

* See Appendix 4 for definition of transit accessibility.

** Measured in passenger miles of travel per mile of the transitway, see Appendix 4.

*** Measured in percent change of 2010 passenger miles of travel.

c. Alternative Evaluation

The Grosvenor-Wheaton-White Oak alternative (#8) has the shortest route. The distance is significant because it would be less costly to construct and operate. It would also take less time to traverse the shorter distance.

Of the five alternatives that have a length nearly the same as the recommended alignment (about eight miles), two connect to White Oak but do not connect the primary activity centers of Grosvenor and Wheaton. Instead, they connect with Glenmont. Moreover, when the eastern terminus is located at Montgomery Industrial Park, Randolph Road, or Fairland, the potential demand is less than when the terminus is at White Oak.

The three alignments shorter than eight miles provide access to the Red Line at the Wheaton Metro station. Two of them connect Wheaton to White Flint rather than to the recommended location of Grosvenor. The other alternative goes through Four Corners and is nearly 20 percent longer than some of the others. (An evaluation of the alternatives is in Table 31.)

US 29 (Alignment A)

No alternatives were evaluated for the US 29 alignment.

Bethesda-Tysons Corner (Alignment P)

Two alternatives of the alignment were tested. The first alternative would run from the Bethesda Metro station in a relatively straight line from Bethesda to Virginia, crossing the Potomac River near Glen Echo. The alignment would be approximately two miles less than the recommended one. The financial and physical feasibility of such a right-of-way is questionable, but the option should be studied by WMATA if it looks at the alignment as a candidate for Metrorail service. It has the potential of greater demand since it is shorter and requires less time to travel.

The second alternative would begin in Montgomery County at Montgomery Mall, where the western terminus of the North Bethesda Transitway is planned. From there, it would turn east at Democracy Boulevard, go south on the west spur of I-270, and continue on the Beltway into Virginia and to Tysons Corner. According to numerous tests, the alternative did not generate significant demand; more travel from Virginia is directed toward the more dense Bethesda and Silver Spring CBDs than toward North Bethesda.



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These references are provided so interested readers can learn more about the issues discussed in the Alternatives Report.

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- Accessibility
 - HOV 53-55, 67
 - transit 21, 29, 41, 46, 98-100, 107
- Activity center 4, 5, 12, 14, 34, 35, 44, 51, 98, 100, 107
- Alternatives Report
 - process 9, 12, 13, 95-101, 105, 107
 - public participation 16
 - recommended alignments 18-20, 22, 24-35, 37-41, 43, 53, 56, 65-68
- Annual Growth Policy 15, 16, 98, 103
- Aspen Hill 25, 26, 29, 33, 65
- Bethesda CBD 32, 56, 57, 92
- Bethesda Metro station 10, 20, 45, 48, 66, 92, 107
- Bethesda-Tysons Corner alignment 10, 20, 23, 24, 44, 45, 44-48, 59, 66, 68, 98, 107
- Bus Service Operational Improvements 19, 49, 67
- Busway 12, 22-28, 38, 39, 41, 43, 45, 59, 66, 73, 90, 91, 98, 102
- Capital Beltway (I-495) 1, 10, 12, 19, 20, 33, 34, 40, 46, 51, 53-56, 61, 62, 66-69, 74, 75, 87, 89, 107
- Citizens Advisory Committee 16, 55
- Clara Barton Parkway/Cabin John Parkway
 - alignment 10, 19, 53, 54, 61, 62, 67, 69
- Clarksburg 9, 10, 12, 89, 91
- Clean Air Act of 1990 77, 78, 81
- Commuter rail 74, 79, 93
- Corridor Cities Transitway 9, 10, 19, 24, 28, 36, 42, 47, 61, 63, 68, 87, 90, 91
- Demand 21, 22, 25, 32, 35, 36, 38, 41-43, 45-47, 49, 95, 96, 98, 100, 101, 106, 107
- Dulles Corridor Transitway 20, 44-46, 66
- Fairfax County 2, 5, 20, 44, 45, 66
- Frederick County 2, 10, 55, 90
- Friendship Heights CBD 9, 10
- Gaithersburg 33, 62, 89, 91
- General Plan Refinement 4, 14, 82, 83
- Georgetown Branch Transitway 6, 9, 23, 24, 28, 30, 32, 33, 35-37, 41, 42-48, 59, 61, 63, 66, 68, 87, 92, 93, 101, 106
- Georgia Avenue (MD 97) 1, 5, 10, 20, 24, 25, 26-29, 57-59, 65, 68, 69, 98, 101-103, 105
- Georgia Avenue alignment 5, 10, 20, 22, 25, 26-28, 58, 65, 68, 98, 101
- Germantown 91
- Glenmont Metro station 5, 10, 25, 29, 102, 105
- Glenmont-White Flint alignment 10, 49, 59, 67, 69
- Grosvenor Metro station 10, 29, 37, 68, 91, 102
- Grosvenor-White Oak alignment 10, 20, 23, 24, 29, 30, 29, 33-37, 48, 59, 66, 68, 69, 98, 102, 29, 30-35, 37, 103, 104
- High-occupancy Vehicle 2, 4-8, 12-16, 19, 34, 39, 40, 43, 49, 51-59, 61-63, 67-69, 73-75, 77-85, 87-90, 112
- Howard County 2, 31, 32, 39
- I-270 10, 12, 30, 34, 39, 51, 53, 55, 56, 61, 62, 67, 69, 74, 75, 82, 84, 87, 89-91, 107, 110
- I-95 12, 55, 61, 87, 89
- Intercounty Connector (ICC) 12, 26, 29, 33, 34, 40, 44, 61, 66, 89
- Intermodal Surface Transportation Efficiency Act of 1991 77-80
- Issues Report 6, 7, 9, 13, 16, 51, 55, 65
- Light rail 7, 12, 26, 28, 31, 38-41, 45, 59, 74, 76, 87, 90-93, 98
- Long range plan 77, 79, 80
- MARC 9, 24, 28, 36, 37, 41, 42, 44, 47, 61, 63, 74, 87, 91, 93, 98, 101, 106
- Maryland Department of Transportation (MDOT) 14, 26, 33, 34, 39, 40, 45, 53, 55, 66, 74, 79, 80
- Maryland Mass Transit Administration (MTA) 41, 90, 92, 93

Index

- Maryland Planning Act 14, 85
- Maryland State Highway Administration
 - (SHA) 32, 38, 39, 56, 67, 68, 87, 89, 90
- Metropolitan Washington Council of Governments (COG) 1, 2, 13, 14, 33, 46, 77, 80, 81, 111
- Metrorail 5, 9, 14, 20, 24, 27-30, 33-37, 41, 42-45, 47, 48, 61, 63, 66, 68, 73, 74, 87, 91, 93, 98, 102, 103, 106, 107, 111
- Midcounty Highway 10, 19, 54, 55
- Mobility 1, 2, 4, 8, 14, 15, 33, 79, 83, 98, 110, 112
- Montgomery County
 - Council 16, 92, 98
 - Department of Transportation (MCDOT) 20, 39, 41, 56, 66, 68, 89, 91, 92
 - Planning Board 2, 5, 16, 32, 65, 77, 81
 - Planning Department 2, 5, 12, 13, 16, 19, 20, 26, 32, 38, 39, 41, 51, 65-67, 73, 83, 91, 100, 111
- Montrose Parkway 10, 56, 57
- New Hampshire Avenue (MD 650) 10, 20, 31, 32, 37-41, 44, 66, 89, 106
- Norbeck Road (MD 28) 10, 25, 26, 29, 49, 59, 67, 69
- North Bethesda Transitway 10, 20, 23, 24, 28, 30, 35-37, 42, 47, 59, 61, 63, 66, 68, 87, 91, 92, 105, 106, 107
- Old Georgetown Road (MD 187) 10
- Olney 5, 10, 26, 27, 29, 34, 58, 65, 102
- Prince George's County 2, 10, 12, 61, 89
- Randolph Road 1, 10, 31, 44, 49, 102, 103, 105, 106, 107
- Ridge Road (MD 27) 10, 54, 55
- River Road (MD 190) 10, 45, 48, 54, 55
- Rock Spring Park 30, 33, 37, 68, 91, 105
- Rockville Metro station 10
- Shady Grove Metro station 91
- Silver Spring CBD 32, 40, 55-58, 93
- Silver Spring Metro station 10, 38-40, 43, 44, 65, 66, 92, 93
- Spencerville Road (MD 198) 10
- Technical Advisory Committee 15, 16
- Through-routing 22-24, 30, 35, 36, 41-43, 45-47, 68
- Transitway and HOV Network Master Plan process 5, 6
- Staff Draft Master Plan 2, 3, 5-7, 16, 20, 65
- Transportation Network Studies 84
- Tysons Corner 5, 10, 20, 23, 24, 44, 45, 44, 45-48, 59, 66, 68, 98, 107
- University Boulevard (MD 193) 10, 30-32, 35, 37, 44, 57, 58, 105
- US 29 1, 10, 20, 23, 24, 29-32, 34, 37-46, 49, 54-56, 58-61, 65, 66, 68, 69, 89, 98, 102, 103, 105-107
- US 29 alignment 37-41, 43, 51, 55, 58, 65, 68, 89, 98, 107
- Veirs Mill Road (MD 586) 10, 49, 56, 57, 59, 67, 69
- Washington, D.C. 1, 2, 9, 13, 14, 20, 27, 33, 38, 44, 53, 55, 61, 66, 74, 77, 80, 81, 110-113
- Wheaton Metro station 10, 29, 31, 37, 40, 102, 105, 107
- White Flint Metro station 10, 102
- Zoning 6, 13, 15, 105, 111

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